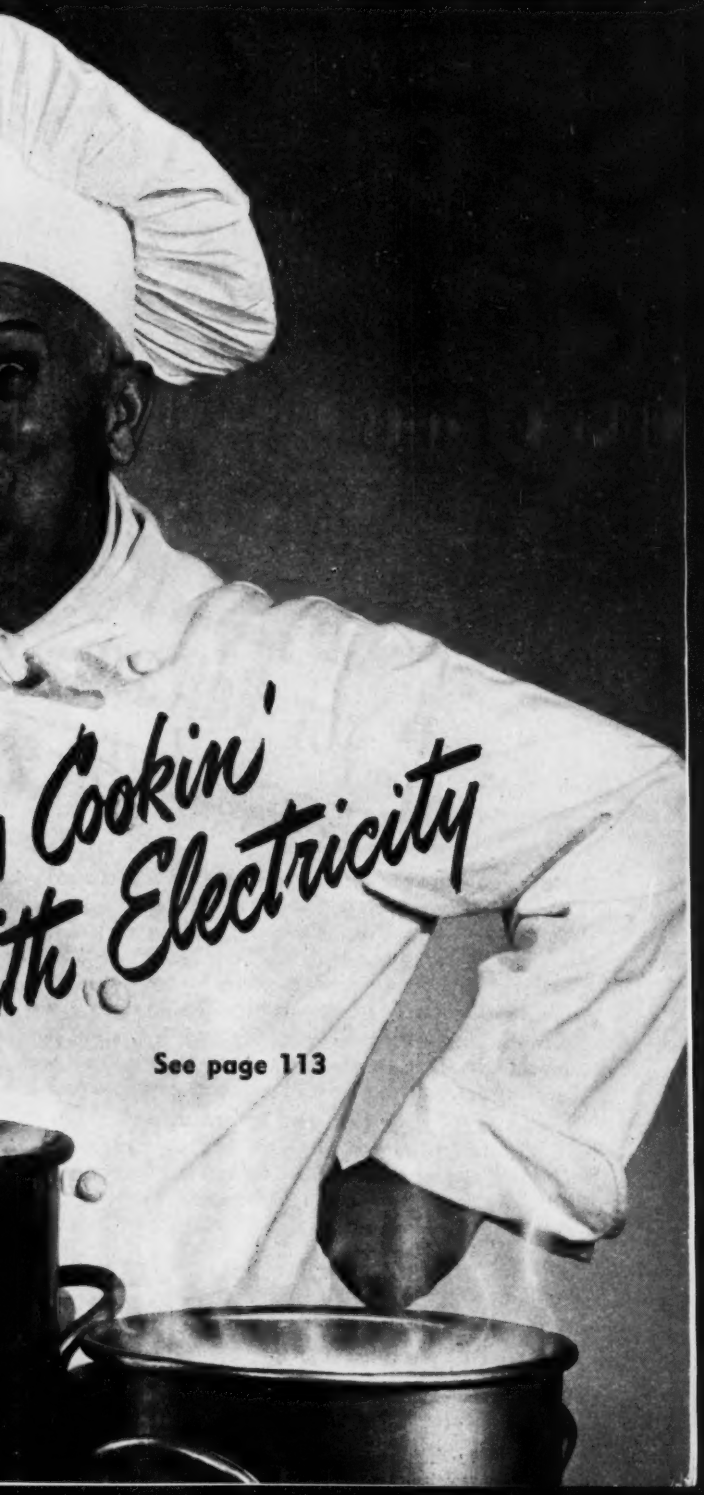
al World

A McGRAW-HILL PUBLICATION



See page 113

Allis-Chalmers distribution regulator in a Minnesota distribution system.

Now you can solve voltage problems fast. Stocks of Allis-Chalmers power and distribution regulators located at 20 strategic points across the country assure fast, efficient delivery when you have voltage troubles. You can end complaints due to low voltage economically and start profits rising faster than ever before.

Allis-Chalmers 5/8% step voltage regulators have proved themselves in the twenty years since they were first introduced. They are low in cost. They are accurate and reliable. And now with the new stocking program, they are the fast answer to voltage problems as well.

Get Full Information

Get the full story on Allis-Chalmers power and distribution regulators. Call your nearest Allis-Chalmers district office today or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3933

FREE MAINTENANCE STICKERS PROVIDE HANDY SERVICE RECORD

You get an on-the-spot record of control settings with these handy, adhesive-backed stickers. They go on any type of regulator, giving all the room you need for a complete service record. Write on them in pen or pencil. Call your nearest A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Originators of 5/8% Step Regulation

Commercial Cooking Survey

The outstanding fact gleaned from the commercial cooking survey (page 113) and reflected again and again in the 119 replies tabulated is that promotion is lagging.

Overlooking the flagrant cases where there is admittedly no effort being made to develop this lucrative field, many reports show commercial cooking in the role of stepchild. All the accepted forms of promotion are being used but in too few cases are they being applied liberally or in good conjunction with one another. Often the programs can only be described as "too little and too late."

A Real Selling Job . . . All electric men know the handicaps in selling commercial electric cooking. The undeniable cost differentials both for initial installation and for use are inescapable. And the facts on the salesman's side are based on intangibles—customer approval, reliability, safety, cleanliness.

To argue against the plain dollars and cents viewpoint is traditionally one of the toughest jobs in the selling field. But it can be done and is being done successfully in some notable instances. Scattered about the nation are utilities—in Alabama, Utah, Pennsylvania, Texas, Connecticut, Ohio, New Jersey—that have seen their cooking load climbing at rates well exceeding 10% and the annual revenue keeping pace with it, all because of determined selling campaigns that resulted in commercial electric cooking installations.

What's the Outlook? . . . The trend is toward increasing the pressure behind the campaigns now in existence, to enlarge and extend their scope. Those companies that have seen results want more of the same. The load is good—it's even and to a large degree off-peak. And customer satisfaction is high.

But the real work must come from those outfits—more than 35% of the group studied—who describe their promotion of commercial cooking with the single word "none." That is where the field is wide open and the obvious job is to "sell—and sell—and sell."

Electrical World

Published for 79 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Vol. 139 No. 12 — March 23, 1953

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mechanically stronger sheath

greater resistance to fire, heat, oil, chemicals

firm, rugged assembly

HAZACORD®

CHALLENGES YOUR COMPARISON FOR

Long life... Low cost service

corrosion resistant conductors

higher breakdown voltages

maximum flexibility and toughness

Hazacord invites your comparison . . . for it's comparison alone that lets you see how HAZACORD QUALITY cuts costs on any flexible cord or portable cable installation.

Every Hazacord is protected by Hazard's exclusive Hazaprene ZBF sheath which means extra resistance to oils, acids, chemicals, moisture, weather. And the Hazaprene sheath is *cured under pressure in a continuous metal mold*—the best method known to provide "tire-tread" toughness with "snake-like" flexibility.

Like the rugged sheath, every Hazacord component—conductor, insulation and filler—is designed and made with the same skill. And every Hazacord, whether for light shop duty or tough mining operations, is assembled with precision and doublechecked for safety and performance even above rated capacity.

Compare Hazacord for quality—it's your best guide to longer-lived flexible cords and portable cables that mean *real* economy. Complete information on Hazacords for all uses is contained in the new 56 page Hazacord Bulletin, H-444; write for your free copy today. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

EMBOSSED:
Hazaprene
ZBF P-104 BM
This embossing is positive proof of mold-curing.

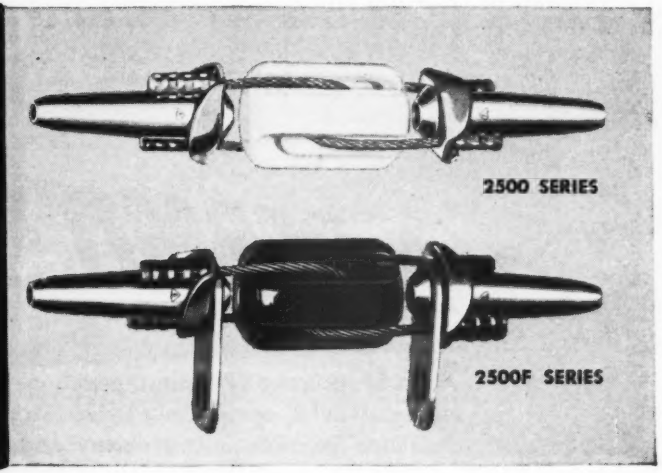
HAZACORD *Mold-Cured* **portable cables**

1345

for the largest number of line applications at the lowest possible cost...

USE *Electroline*

Insulating Automatic Line Splice SECTIONALIZERS



The Electroline Sectionalizers are assemblies that will function in service as most convenient, reliable and yet low cost interrupting devices. Series 2500-F and 2600 provide for paralleling with a fuse element for further protection when sectionalizing. The mechanical strength of these assemblies exceeds in all cases the rated breaking strength of the conductor for which they are adapted.

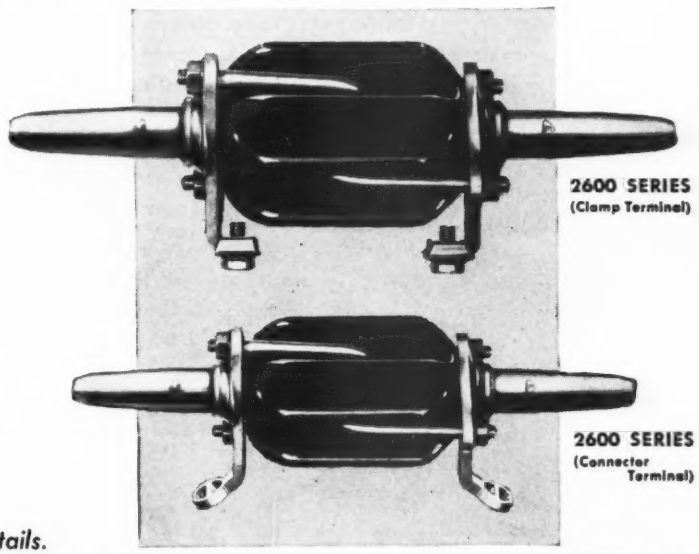
These Insulating Automatic Line Splice Sectionalizers are ideal for:

Installing Regulating Equipment,
simplifies cutting-in disconnecting points, fuses, voltage regulators and series capacitors;

Restoring Service,
providing points to test for trouble;

Sectionalizing Networks,
to readily isolate and test the area in trouble;

Series Street Lighting,
simplifies cutting-in series street lamps—merely cut the line and insert conductor ends into sectionalizer.



Send for Bulletins containing complete details.

PATENT TO ORIGINATE
E
ABILITY TO PRODUCE

Electroline Company

4121 South La Salle Street • Chicago 9, Illinois
In Canada: POWERLITE DEVICES, LTD., TORONTO

Alduti Interrupter Switches

PERMIT ARC-FREE

The practice of mounting sectionalizing switches upright to provide arc clearance is often inconvenient and costly. This is especially true where a vertical conductor configuration is used. In this case, the transposition of conductors into the horizontal plane for pole top switching requires a longer span and a higher pole; and the wide spacing demanded by horn gap switches often results in a costly supporting structure.

On the other hand, with the installation of an Alduti Interrupter Switch vertical conductor configuration, regular span lengths and regular pole height can be retained. In many cases the installation can be made on an existing line pole, and no switch supporting structure other than the pole itself is needed.

Because Alduti Interrupter Switches operate without external arcing there is no limitation imposed on line design to provide arcing clearance for switches. Switch configuration can conform to the configuration of the line. This opens the door to development of "unconventional" improvements in switch mounting techniques, of which the illustration is a typical example.

Yet these structural advantages are but part of the story. With interrupter switches you are no longer restricted to present sectionalizing practices. Feeders and branch lines can now be safely switched without sequencing with breakers or dropping individual loads —because Alduti Interrupter Switches interrupt not only line or cable charging currents, but also 600 amperes of load current.

Why not discuss with your S&C sales representative the advantages of this new kind of sectionalizing switching.

Alduti Interrupter Switches are supplied in the following ratings:

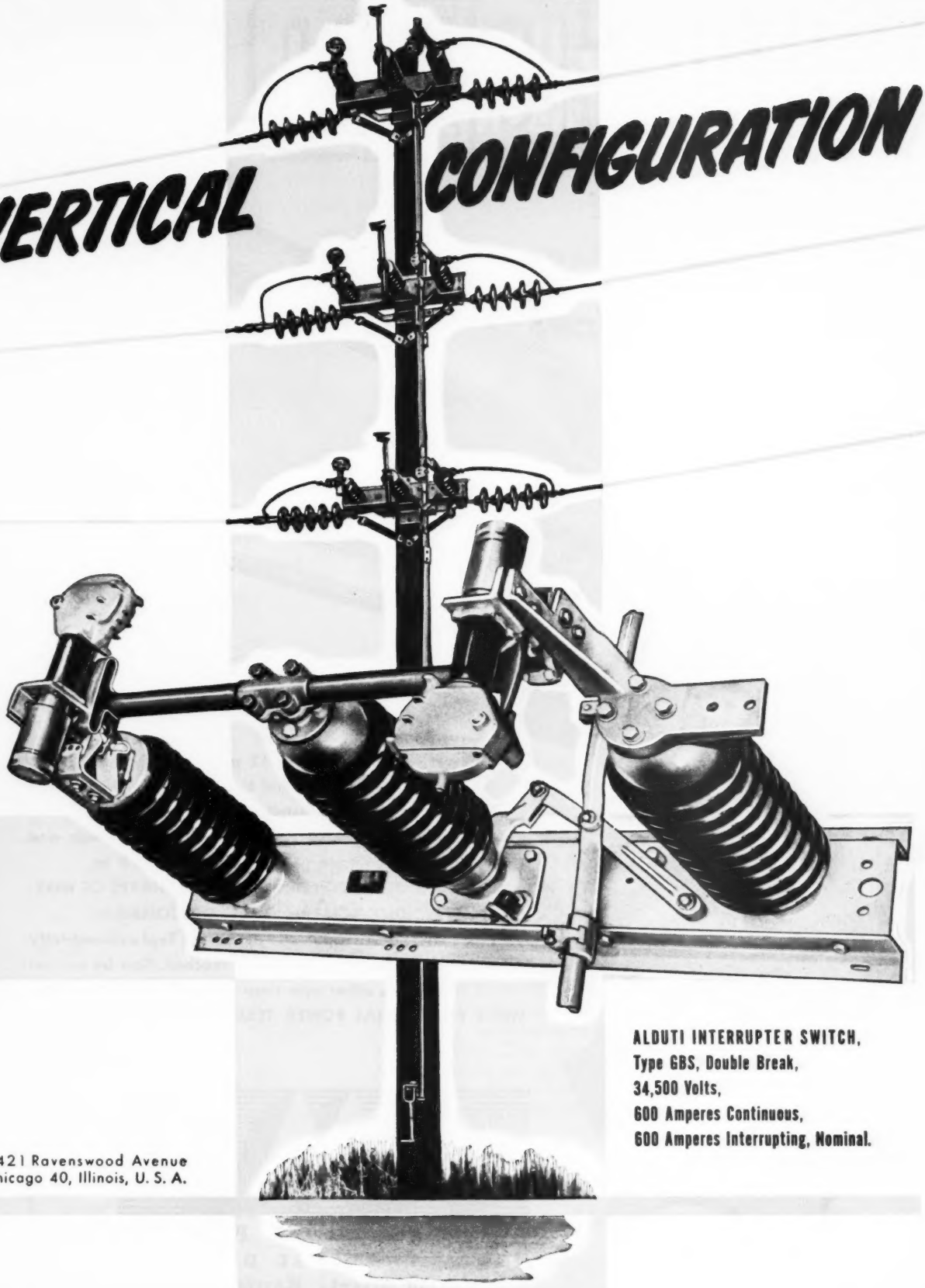
Volts	Amperes Continuous	Amperes Interrupting, Nominal
For hook stick or group operation		
7500 & 15000	400, 600, 1200	400, 600
For group operation only		
23000 & 34500	600	600

S&C ELECTRIC COMPANY

Formerly SCHWEITZER & CONRAD, INC.

In Canada, Powerlite Devices, Limited, Toronto

VERTICAL CONFIGURATION



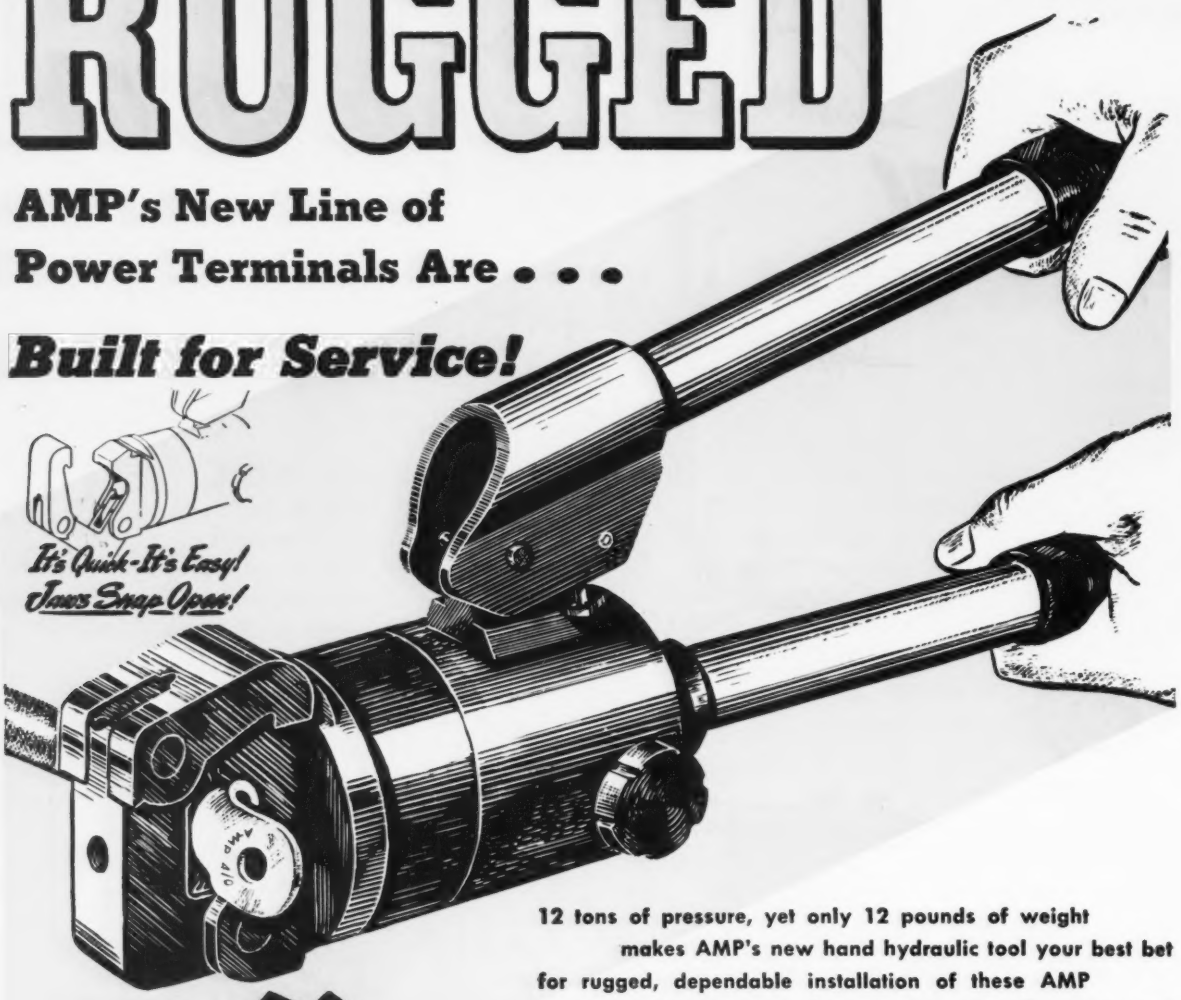
ALDUTI INTERRUPTER SWITCH,
Type GBS, Double Break,
34,500 Volts,
600 Amperes Continuous,
600 Amperes Interrupting, Nominal.

4421 Ravenswood Avenue
Chicago 40, Illinois, U. S. A.

RUGGED

AMP's New Line of Power Terminals Are . . .

Built for Service!



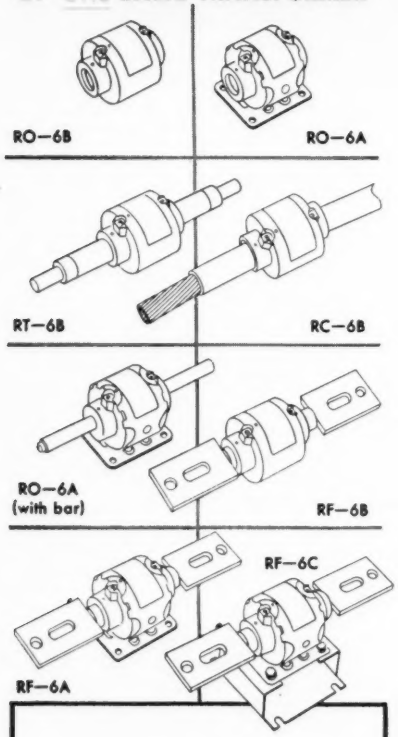
12 tons of pressure, yet only 12 pounds of weight makes AMP's new hand hydraulic tool your best bet for rugged, dependable installation of these AMP *precision-engineered* power terminals. Terminals and connectors are available in all ranges from #8 to #4/0. DESIGNED FOR USE ON ALL SHAPES OF WIRE: SOLID, STRANDED, SQUARE, OVAL, OR COMBINATIONS! Dies snap in and out easily. Tool automatically releases when crimping pressure is reached. Can be used with either pole strap or bench stand if desired. WRITE FOR SPECIAL POWER TERMINAL CATALOG.

AMP Trade-Mark
Reg. U. S. Pat. Off.

AMP

AIRCRAFT-MARINE PRODUCTS INC.
POWER TERMINAL DIVISION
2100 Paxton Street, Harrisburg, Pa.

EIGHT VARIATIONS OF ONE BASIC TRANSFORMER



SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Sangamo Type R
Current Transformers
600 Volt—25/60 Cycle

These completely new current transformers lend themselves to a great variety of installations that help lower the overall cost of measurement of low voltage loads.

They are exceptionally small in size (the basic transformer is less than 4″ in length)—but meet the A.S.A. 0.3 metering accuracy classification for B-0.1 and B-0.2 burdens. They are so light in weight that good practice will be met even if they are supported by the primary conductor only. They have ratings of 200 and 400 amperes and have a current carrying capacity of twice their nominal rating.

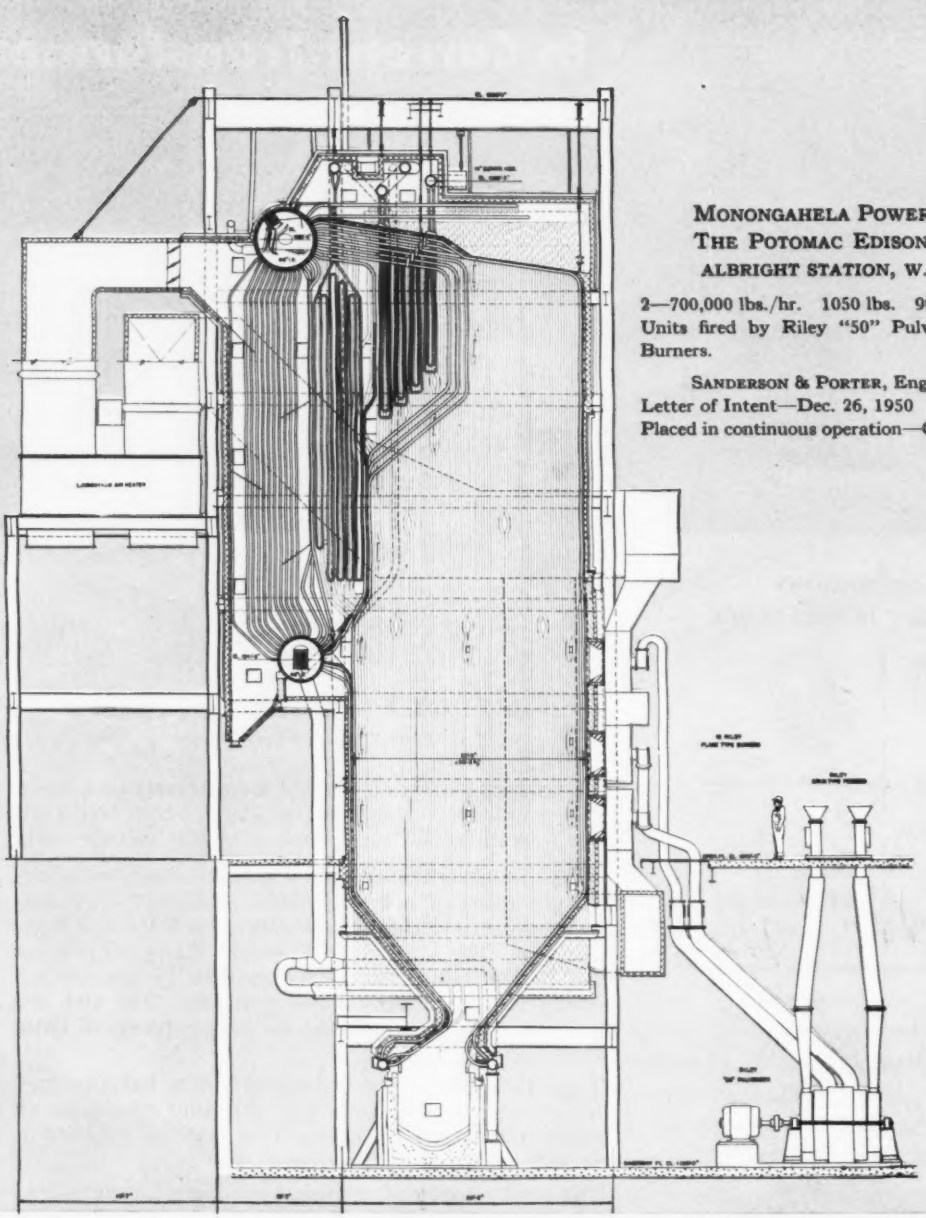
Type R Transformers are encased in a bakelite shell filled with a thermo-setting plastic that eliminates all voids and prevents moisture from reaching the core or windings even when submerged.

The eight variations, shown at left, permit a variety of primary arrangements to meet almost any form of connection. This new type of transformer permits the engineer to use his ingenuity in devising cost cutting methods of installation. Full information is given in Bulletin 501. Write for your copy today.

Only Measured Facts are Known Facts

SM53-2

700,000 lbs./hr. Riley Units at



MONONGAHELA POWER CO.
THE POTOMAC EDISON CO.
ALBRIGHT STATION, W. VA.

2—700,000 lbs./hr. 1050 lbs. 905°F. Riley Units fired by Riley "50" Pulverizers and Burners.

SANDERSON & PORTER, Engineers
Letter of Intent—Dec. 26, 1950
Placed in continuous operation—Oct. 1, 1952.

TRADE MARK Rx REGISTERED

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STOKER CORPORATION, WORCESTER, MASS.

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Cincinnati Charlotte Atlanta New Orleans St. Louis Kansas City St. Paul Tulsa Houston
Denver Salt Lake City Los Angeles Portland Seattle

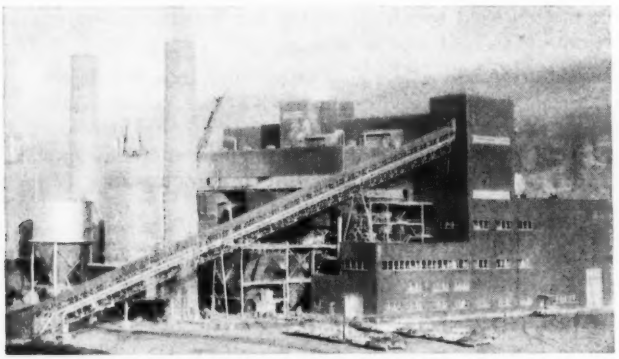
BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • ECONOMIZERS

Albright Station go on the line

21 months after letter of intent

A letter of intent dated December 26, 1950 was given Riley Stoker Corporation by Monongahela Power Co. and The Potomac Edison Company covering the first two 700,000 lbs./hr. units for their new Albright Station. In spite of the fact that this was a completely new station and the difficulties in procurement of materials, the first unit was placed in continuous operation October 1, 1952, only 21 months after date of award, performing as guaranteed and predicted, and without the necessity of shutdowns for adjustments or corrective measures.

It is because of performance like this—engineering, fabrication, erection and operation of the equipment—that so many public utilities and industrials have swung to Riley. By investigation and experience one after another has found that you can rely on Riley. Be sure to investigate Riley equipment and request a Riley proposal when considering new steam generating or fuel burning equipment. You will be glad you did so.



A Few Recent Riley Public Utility Units

TEXAS ELECTRIC SERVICE CO.
1,250,000 lbs./hr. 2125 psig, 1005°F. and 1005°F. reheat

DALLAS POWER & LIGHT CO.
1,250,000 lbs./hr. 2125 psig, 1005°F. and 1005°F. reheat

HOUSTON LIGHTING & POWER CO.
1,250,000 lbs./hr. 2125 psig, 1005°F. and 1005°F. reheat

DEPARTMENT OF WATER AND POWER CITY OF LOS ANGELES, CALIFORNIA
1,200,000 lbs./hr. 2075 psig, 1000°F. and 1000°F. reheat.

LOUISIANA POWER & LIGHT CO.
1,000,000 lbs./hr. 1725 psig, 1005°F. and 1005°F. reheat.

SOUTHWESTERN GAS & ELECTRIC CO.
630,000 lbs./hr. 1050 psig, 1005°F.

MONONGAHELA POWER CO.
700,000 lbs./hr. 1050 psig, 905°F.

UTAH POWER & LIGHT CO.
575,000 lbs./hr. 1700 psig, 1000°F. and 1000°F. reheat.

CENTRAL ILLINOIS LIGHT CO.
600,000 lbs./hr. 950 psig, 900°F.

NORTHERN STATES POWER CO.
385,000 lbs./hr. 1500 psig, 950°F.

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
460,000 lbs./hr. 1025 psig, 900°F.

THE POTOMAC EDISON CO.
700,000 lbs./hr. 1050 psig, 905°F.

IOWA ELECTRIC LIGHT & POWER CO.
300,000 lbs./hr. 975 psig, 910°F.

GULF POWER CO.
325,000 lbs./hr. 1000 psig, 900°F.

SOUTH CAROLINA GAS & ELECTRIC CO.
400,000 lbs./hr. 1475 psig, 955°F.

UTAH POWER & LIGHT CO.
620,000 lbs./hr. 1500 psig, 955°F.

IOWA-ILLINOIS GAS & ELECTRIC CO.
250,000 lbs./hr. 975 psig, 905°F.

PUBLIC SERVICE CO. OF INDIANA
400,000 lbs./hr. 1000 psig, 910°F.

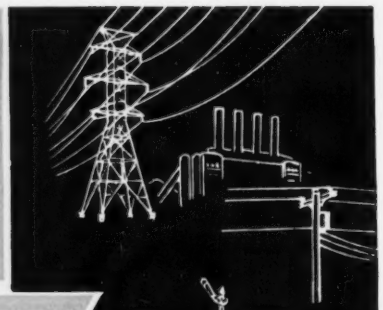
A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs

COMPLETE STEAM GENERATING UNITS

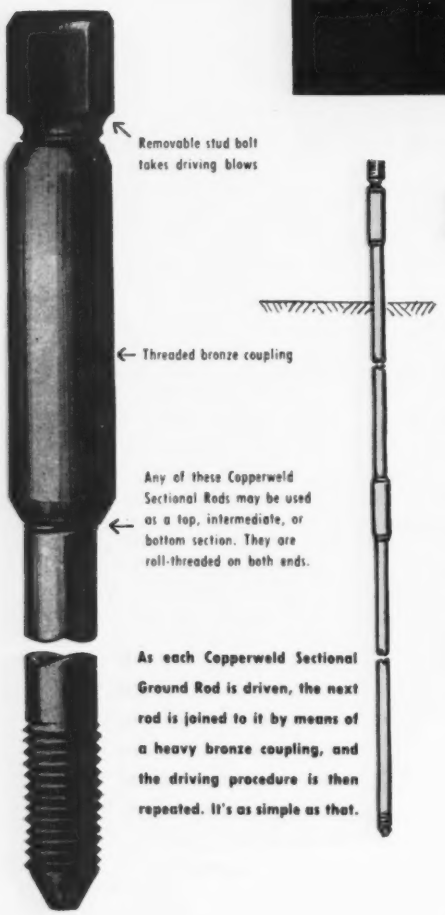
. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • AIR HEATERS

OUT with Costly Outages!



GET PERMANENT DEEP-DOWN PROTECTION WITH Copperweld


Removable stud bolt takes driving blows
Threaded bronze coupling
Any of these Copperweld Sectional Rods may be used as a top, intermediate, or bottom section. They are roll-threaded on both ends.
As each Copperweld Sectional Ground Rod is driven, the next rod is joined to it by means of a heavy bronze coupling, and the driving procedure is then repeated. It's as simple as that.

SECTIONAL GROUND RODS

In most localities deep grounding will provide low resistances more economically than multiple shallow grounds. More and more engineers are turning to Copperweld* Sectional Ground Rods for this deep-down protection. These superior ground rods do the job quickly, permanently and at low cost.

Copperweld Sectional Ground Rods have a stiff alloy steel core to provide the rugged strength for easy driving. This core is permanently protected from corrosion by a thick, molten-welded layer of copper having high conductivity. No other ground rod has this inseparable molten-weld which eliminates the possibility of electrolytic action.

Whether you drive only a few lengths by hand or penetrate the earth's sub-surface with the aid of a power hammer, you can do it quicker, better, and at low cost with Copperweld Sectional Ground Rods. And at the same time, you'll get permanent and consistent low-resistance grounding protection against costly outages.

*Trade Mark

HOW TO DRIVE DEEPER AND AT LOW COST

Equipped with a demountable steel framework supporting a Barco gasoline hammer, this truck is demonstrating that effective, low-resistance deep grounding can be accomplished in a simple, economical manner with Copperweld Sectional Ground Rods. You can readily duplicate this rig in your own shops. Complete plans will be mailed to you upon request.

Made by
COPPERWELD STEEL COMPANY
Glassport, Pa.

THEY'RE MOLTEN-WELDED Copperweld GROUND RODS

Stocked And Sold By:
HUBBARD AND COMPANY • JOSLYN MFG. & SUPPLY CO.
And All Their Distributors

As Dependable as the Line or Bus

Setting up circuits for line rearrangement or apparatus overhaul is facilitated by easy-operating Pacific Air Switches which embody the experience of 47 years of air-switch manufacture.

These switches incorporate special means for minimizing the effects of ice, sleet, and high winds . . . and electrically they approach the dependability of the bus.

PACIFIC ELECTRIC

Type TG

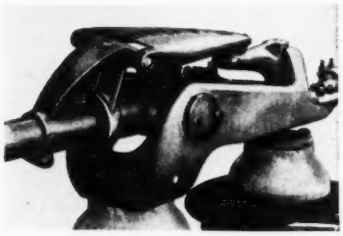
AIR SWITCHES

with

SOLID-SILVER INSERTS

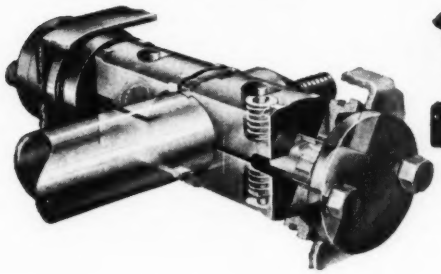
115, 161, 196, 230, and 287 kv
(other types 7.5 kv and up)

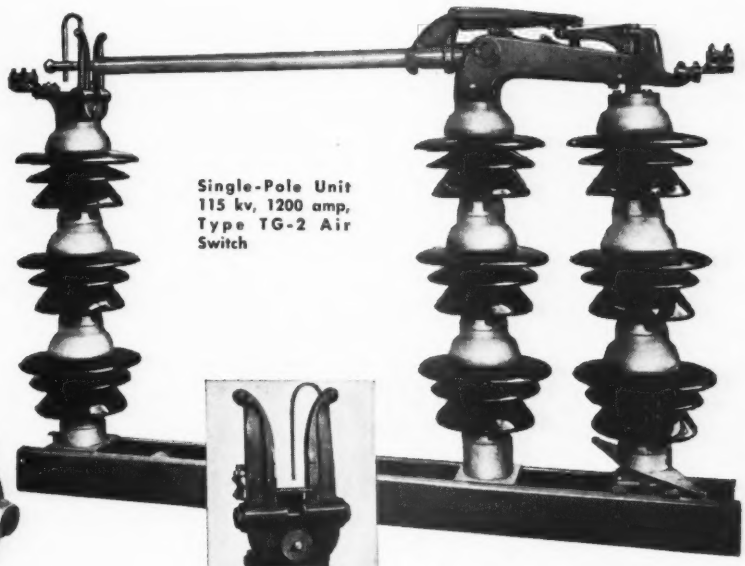
ASA AND NEMA STANDARD



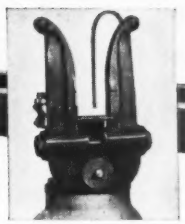
Above: Hinge Assembly — Switch Closed

Below: Phantom Interior of Continuously Applied Full-Floating Hinge-End Contacts (these are contained within a weatherproof housing, not shown)





Single-Pole Unit
115 kv, 1200 amp,
Type TG-2 Air
Switch



At left: Contact Clip Assembly

ELECTRICAL CONNECTION at the hinge of the Pacific Type TG Air Switch is through massive continuously applied full-floating duplex contact shoes having solid-silver inserts at all shoe contact points.

The configuration of the current path through the hinge is such that the contact pressure increases because of the electromagnetic forces of large momentary or fault currents.

The contact forks at the opening end of the switch do not bend as springs; each half-fork acts independently under adjustable pressure of a preloaded helical spring. This assures substantially constant pressure regardless of contact wear or off-center entry of blade. Both blade and forks have solid-silver inserts.

Generous use of enclosed anti-friction bearings, hardened and ground non-corrodible pins, and precision machining characterize the mechanical design.

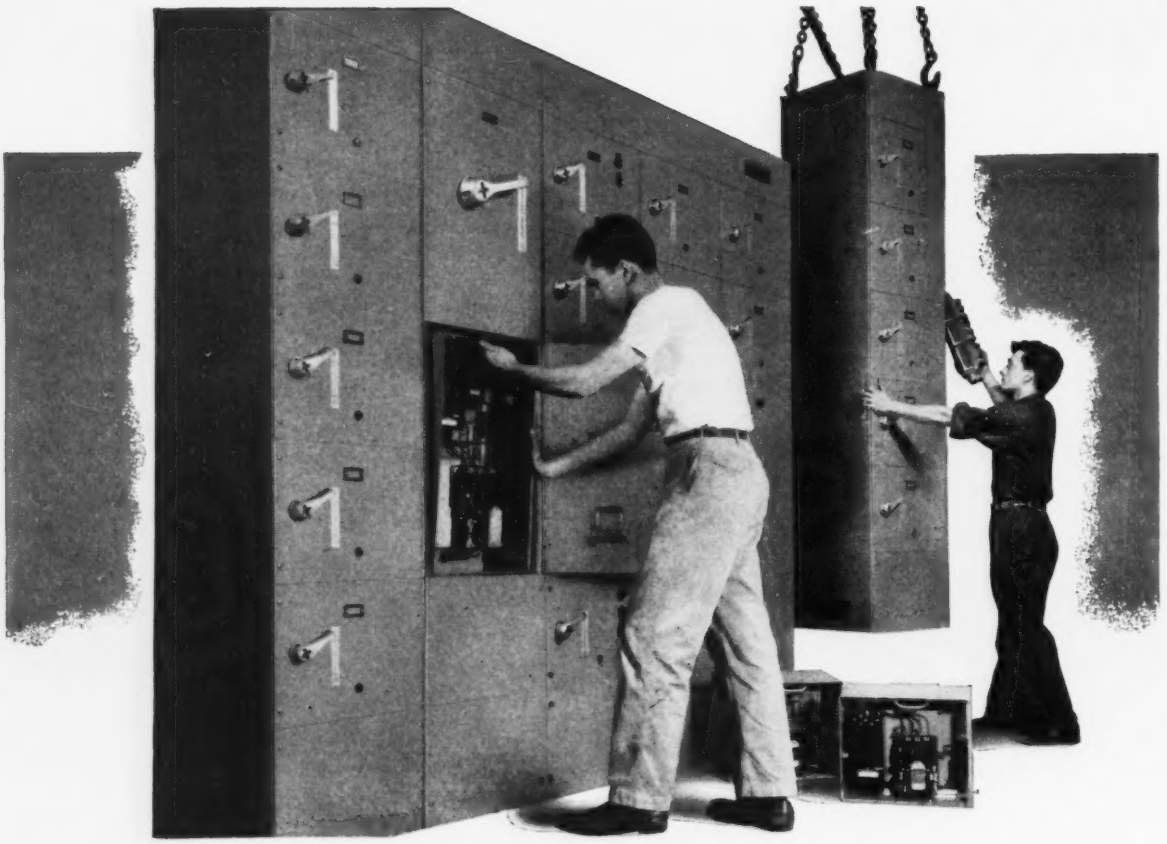
A complete switch comprises three single-pole units together with operating mechanism. A grounding switch may be included, if desired.

PACIFIC ELECTRIC • MFG. CORPORATION •

5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA
OTHER FACTORIES: SANTA CLARA, CALIFORNIA; GARY, INDIANA

Since 1906

SALES OFFICES or AGENCIES
in PRINCIPAL CITIES



FLEXIBILITY

of electrical components...of structural units

Another reason why most control center buyers specify WESTINGHOUSE

No matter what type and size of motor control you need, you can house it in a Westinghouse Control Center. That's not so unusual in itself. But, the important thing is the ease with which these control units are initially installed and then interchanged as circuit requirements change.

The secret is in the standardization of cubicle dimensions. The height of these units are 14″ or multiples of 14″. Thus, all units are completely interchangeable. One 28″ unit can replace two 14″ units—three 14″ units can replace one 42″ unit—etc.

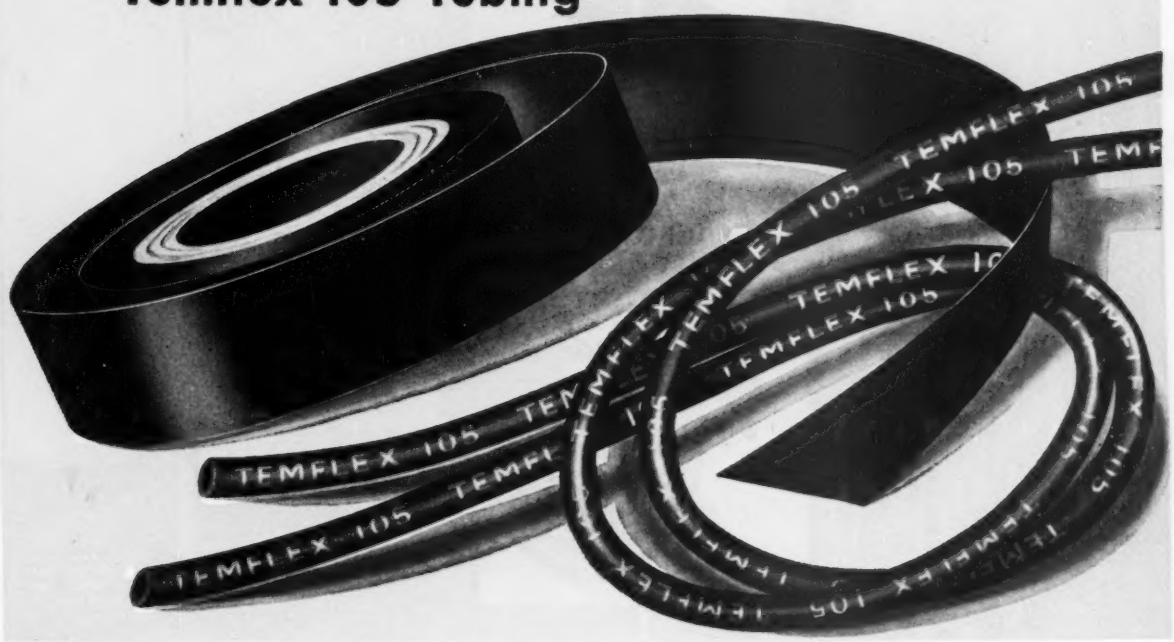
Standardization of vertical structures also aids flexibility. You can arrange, rearrange, add or subtract vertical structures to meet any requirement. Each structure dovetails perfectly with its neighbors.

Need help? Westinghouse offers you the services of an application engineer to work with you on your control center planning. Call your local Westinghouse office today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-27023-A

YOU CAN BE SURE...IF IT'S

Westinghouse

Now- an Irvington
PLASTIC INSULATING TAPE
with the heat- and oil-resistance of Temflex® 105 Tubing



Here is a new addition to the Irvington family of insulating tapes — Temflex 105 Plastic Tape, based on the *same* formula that has made Temflex 105 Tubing the leader where service calls for continuous operation in air at 105° C. — or in oil at 90° C.

Temflex 105 Tape is strong and flexible — possesses exceptional elongation. It can be easily hand wound over bus bars, coils, cables — even over very irregular surfaces — or can be used in taping heads. Temflex 105 Tape frequently offers substantial savings as compared with varnished cambric. Easily baked to a homogeneous mass, it also offers cost economies over pressure-sensitive tapes.

Made in thicknesses of .007", .010" and .012"; widths from ½" to 34". Dielectric strength as high as 1200 vpm *even at 100° C.* Tensile strengths up to 3100 psi — elongation 165% to 240%.

Look to
IRVINGTON
for Insulation Leadership
INSULATING VARNISHES
VARNISHED CAMBRIC
VARNISHED PAPER
VARNISHED FIBERGLAS
INSULATING TUBING
CLASS "H" INSULATION

You probably know Temflex 105 *Tubing* — you'll certainly want to learn about Temflex 105 *Tape*. Mail the coupon for technical data sheet.

Send this convenient coupon now

Irvington

VARNISH & INSULATOR COMPANY

21 Argyle Terrace, Irvington 11, New Jersey

Plants: Irvington, N. J.; Monrovia, Calif.; Hamilton, Ontario, Canada

Irvington Varnish & Insulator Company EW-3/53
21 Argyle Terrace, Irvington 11, New Jersey

Gentlemen:

Please send me technical data sheet on your new Temflex 105 Tape.

Name..... Title.....

Company.....

Street.....

City..... Zone..... State.....

The Perfect Combination . . .

WESTERN RED CEDAR POLES

LIFE-SPAN full length Immunization

Here truly is an unbeatable combination . . . Nature's most perfect poles treated the LIFE-SPAN way. Every Western Red Cedar Pole receives complete end-to-end treatment, first in a hot solution to drive out the air and prepare the wood cells for preservative absorption; next a sudden submersion under a cold pentachlorophenol solution which contracts the expanded air in the cells. This creates a vacuum sufficient to pull the solution deep into the sapwood. Pole protection is sealed for life, insuring dependable service up to pole line obsolescence.

Linemen like LIFE-SPAN poles because they are clean, easy to handle, and safe to work on. Utility companies like them because they offer dependable service and they build good public relations for the companies using them.

To be sure, to be doubly safe . . . specify LIFE-SPAN Western Red Cedar Poles.

The same LIFE-SPAN treatment is also available for Fir, Western Larch and Lodgepole Pine.

CONSOLIDATED TREATING CO.
MINNEAPOLIS, MINNESOTA

For further information write any of the following:

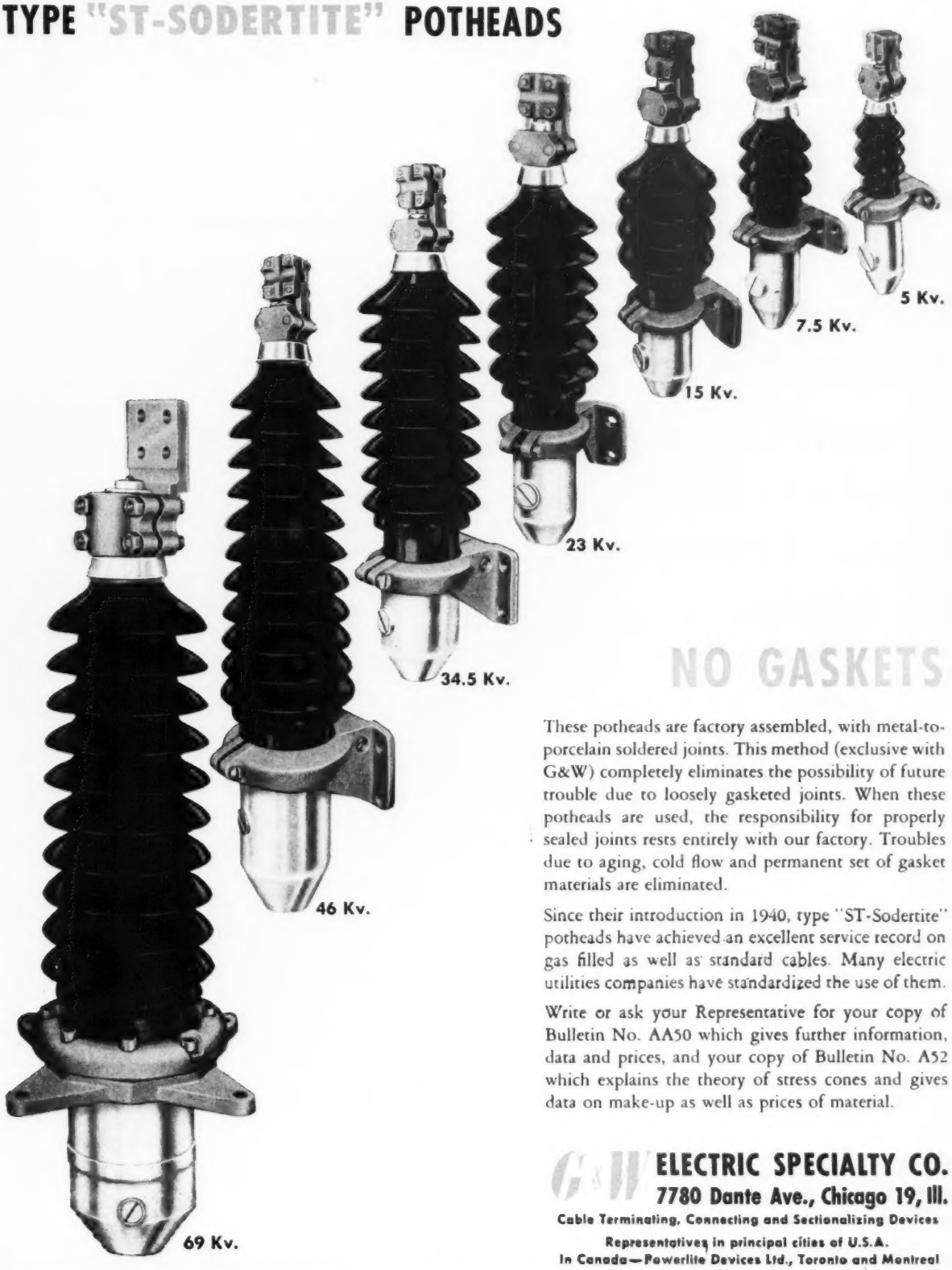
B. J. CARNEY & CO.
Spokane - Minneapolis

SCHAEFER-HITCHCOCK CO.
Sandpoint, Idaho
Suppliers for Joslyn Mfg. & Supply Co.

NAUGLE POLE & TIE CORP.
Chicago, Illinois

PAGE & HILL, INC.
Minneapolis, Minnesota
50 Church Street, New York, N. Y.

ASSURE PERMANENT PROTECTION FOR CABLE ENDS WITH G&W TYPE "ST-SODERTITE" POTHEADS



NO GASKETS

These potheads are factory assembled, with metal-to-porcelain soldered joints. This method (exclusive with G&W) completely eliminates the possibility of future trouble due to loosely gasketed joints. When these potheads are used, the responsibility for properly sealed joints rests entirely with our factory. Troubles due to aging, cold flow and permanent set of gasket materials are eliminated.

Since their introduction in 1940, type "ST-Sodertite" potheads have achieved an excellent service record on gas filled as well as standard cables. Many electric utilities companies have standardized the use of them.

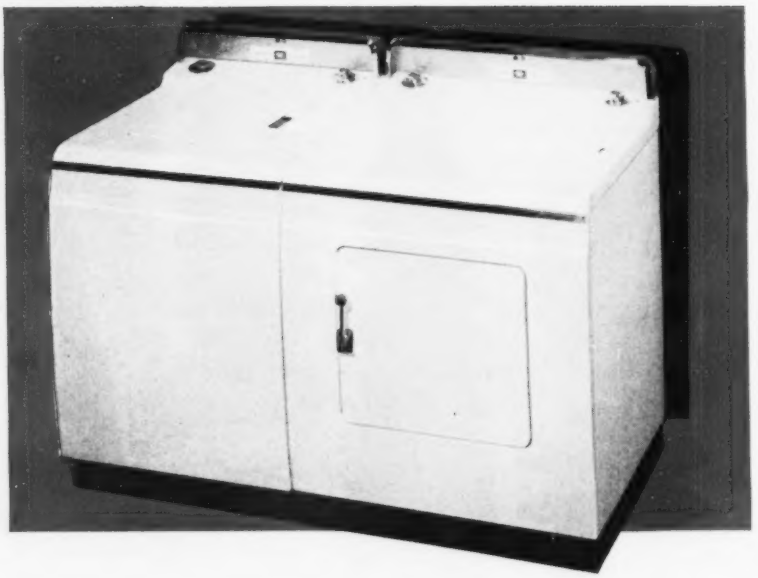
Write or ask your Representative for your copy of Bulletin No. AA50 which gives further information, data and prices, and your copy of Bulletin No. A52 which explains the theory of stress cones and gives data on make-up as well as prices of material.

G&W ELECTRIC SPECIALTY CO.
7780 Dante Ave., Chicago 19, Ill.
Cable Terminating, Connecting and Sectionalizing Devices
Representatives in principal cities of U.S.A.
In Canada—Powerlite Devices Ltd., Toronto and Montreal

Hotpoint

Automatic Launduet

Creating Wider Acceptance for Automatic Home Laundries—Hence, Greater Revenue for Utilities!



The Hotpoint Launduet's popularity has helped to establish the present sales dominance of automatic home laundry equipment. Unit sales of automatic washers now surpass conventional types, and surveys indicate automatic dryers hold top position as the appliance most women want next. All this means added revenue for the utilities.

Hotpoint's Automatic Washer with its two-cycle WOND-R-DIAL control for normal wash or delicate fabrics . . . self-cleaning sediment ejector tubes . . . COUNTERFLO water action . . . fluid drive . . . protection against unbalanced loads . . . offers automatic washer features wanted most by most women.

Hotpoint's Automatic Dryer offering freedom from lint and moisture in the laundry room with no need for outside venting . . . CONDITION-D-AIRE sealed drying chamber . . . thermostatically controlled heat adjustment . . . hermetically-sealed Calrod® heating units . . . creates a new high in home laundry drying efficiency.

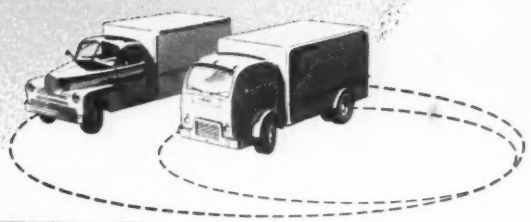
Have your Hotpoint distributor show you the amount of additional revenue Hotpoint's Launduets can mean to you today—and for years ahead.

Again Hotpoint *looks at Tomorrow, Today*

HOTPOINT Co. *(A Division of General Electric Company)* ***5600 West Taylor Street, Chicago 44, Illinois***

Are you taking advantage of SPECIALIZED DESIGN

to meet your changed transportation problems?



Left—This Model 3016 White maneuvers closer to job site . . . saves time in transit . . . adds new safety features for Northern States Power Co., Minneapolis, Minn.

Right—This Model 3020 White owned by Winnipeg Electric Co., Winnipeg, Manitoba, is equipped with workshop body and winch. Its maneuverability saves time for its crew . . . gets work done faster.

TAILORED to your exact work, the White 3000 reduces your transportation cost...does more work every day in your service.

Today's heavy traffic and congestion and other exacting operating conditions mean *your* trucks should be engineered to your own service needs—with new maneuverability, extra carrying capacity, quicker loading, added safety features, and driving ease.

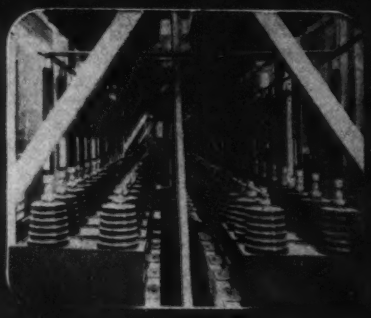
You have all these—and more—in the White 3000. See your White Representative for facts about the extra economy of White Specialized Design.

Tips its cab to service

THE WHITE MOTOR COMPANY • *Cleveland 1, Ohio*

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

1939



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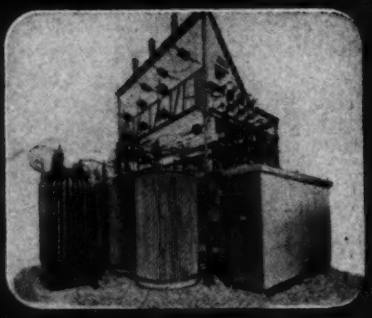

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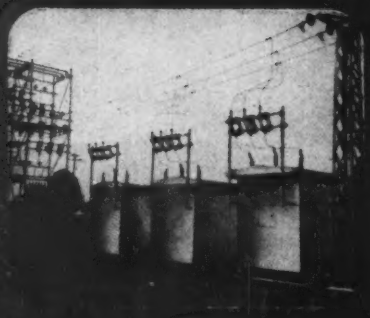
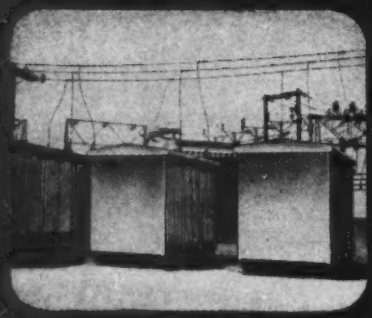


1946

1940

1946



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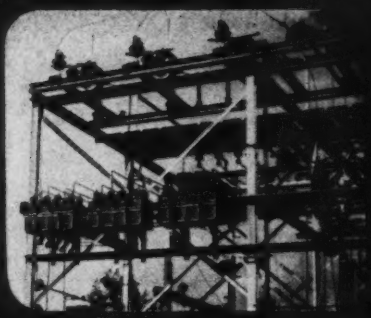

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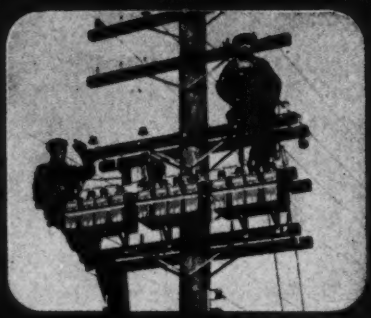

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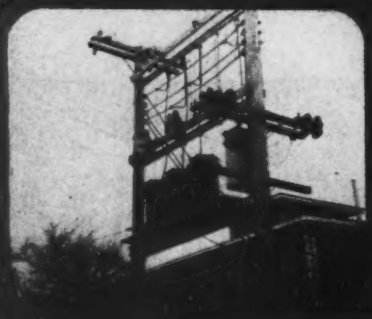

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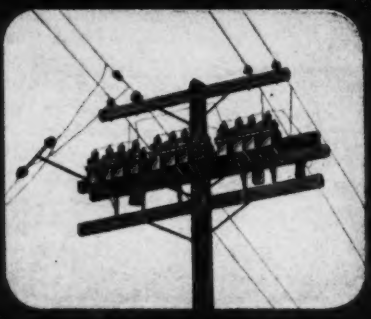

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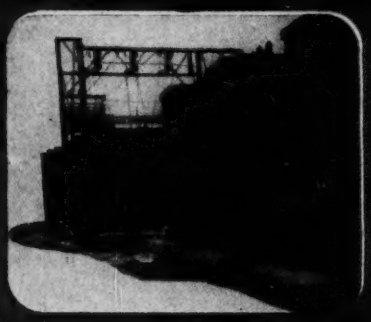

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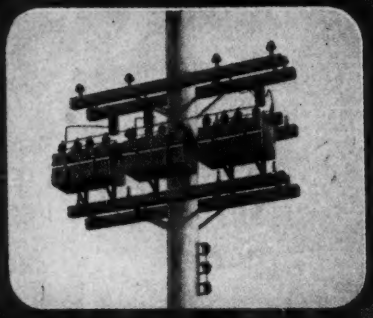

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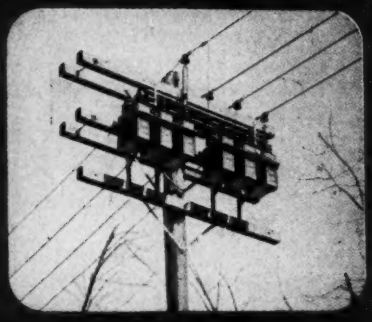

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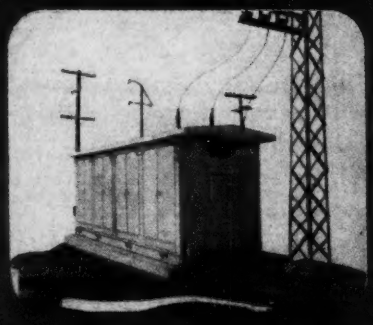


1946

the Years write an impressive testimonial to Cornell-Dubilier Capacitors

You will find them in the stations and on the poles of the country's largest power producers: C-D capacitors that have been in continuous operation since 1938, 1939, 1940 with *little or no maintenance required!* Over 4,000 time-tested C-D installations confirm that this is truly the most *consistently dependable* capacitor for power-factor improvement.

C-D gives you these extra safety factors

- C-D capacitors are designed to withstand transient over-voltages as well as steady state voltages. Low dielectric unit stress provides this extra margin of safety.
- Heavy major insulation in the form of laminated liners with reinforced corners, insures highest impulse withstand levels.
- Only C-D capacitors (from 230 to 13,800 volts), are subjected to a full rated voltage energization test.
- Wide margin between paper and foil provides higher insulation level.
- Use of C-D's Dykanol results in lower unit weight per KVAR; high stability; long life.
- Heavy-Duty wet process porcelain bushings for longer creepage path, less breakage, higher impulse rating.

Planning an installation of industrial, station or pole-type capacitors for power-factor improvement? You can save maintenance dollars and insure trouble-free service by talking it over with a C-D engineer. Cornell-Dubilier Electric Corp., Dept. D-33-A, South Plainfield, N. J.

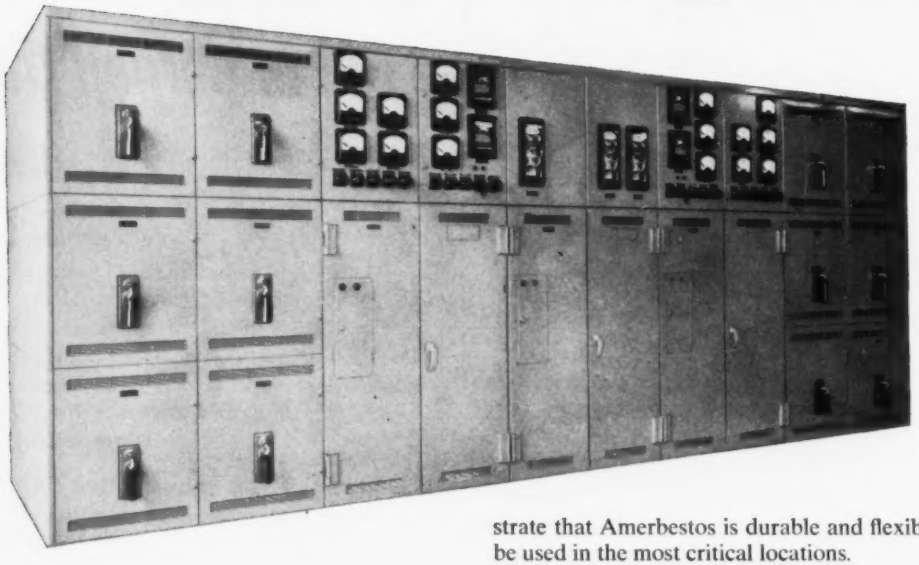
CONSISTENTLY DEPENDABLE

CORNELL DUBILIER

CAPACITORS

PLANTS IN SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER, AND CAMBRIDGE, MASS.; PROVIDENCE, R. I.; INDIANAPOLIS, IND.; FUQUAY SPRINGS, N. C.; AND SUBSIDIARY, THE RADIART CORP., CLEVELAND, OHIO

"We've got to have a and we're getting



I-T-E says, "Our switchgear goes into central power plants that serve entire cities. The failure of *one wire* could shut down a million-dollar turbine and cause a total power blackout. Process plants could lose millions in ruined products and interrupted production. The stakes are too high for us to use anything but a top quality wire, and we're getting it with Amerbestos."

For the switchgear shown here, I-T-E uses U·S·S Amerbestos 90C type TA: copper strand—thermoplastic insulation—felted asbestos—flame-resistant cotton braid. The homogeneous thermoplastic insulation gives excellent moisture protection; and, even more important to I-T-E, it can be bent to a much shorter radius than helically-wound insulations. As a matter of fact, I-T-E found that after a bending test, this type of Amerbestos construction could withstand a breakdown voltage *20 to 30 times* higher than helically-wound insulations. While this was an unusually severe test, it does demonstrate that Amerbestos is durable and flexible enough to be used in the most critical locations.

Since the very reputation of I-T-E is built upon the high quality of their product, they demand close quality control from suppliers, too. "And," says I-T-E, "We know that American Steel & Wire checks, tests and inspects every foot of wire we get." I-T-E also remarked that the Amerbestos conductors are always well centered in the insulation, and the thermoplastic insulation shows no tendency to flow or become brittle.

You can get this same high quality from American Steel & Wire no matter what kind of wire or cable you use. Send the coupon and get more information about Amerbestos; or, better still, outline your wire or cable problems and give our engineers a chance to help you.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

A STANDARD Cable for every

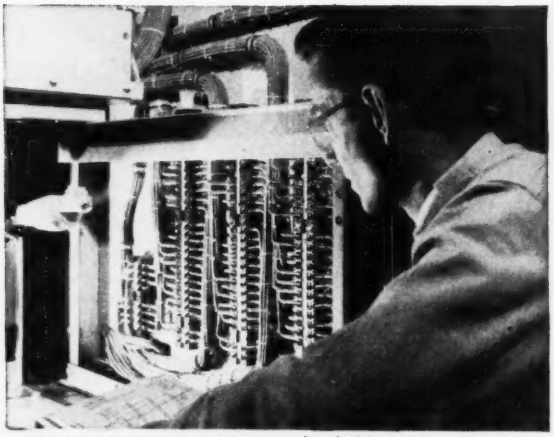
- **paper & varnished cambric cable**
- **asbestos wire and cable**
- **aerial, underground & submarine cable**
- **shovel & dredge cable**

AMERICAN STEEL & WIRE DIVISION
USS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL

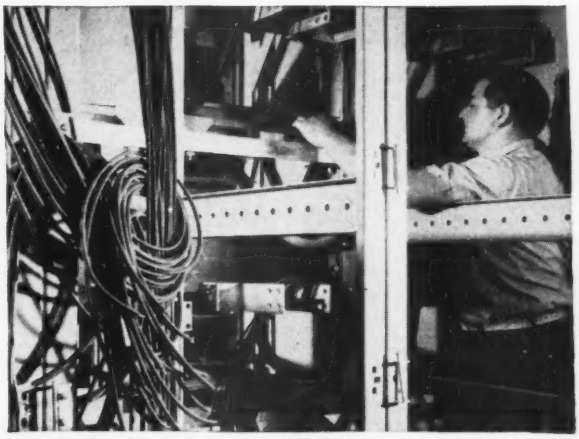
U·S·S AMERICAN ELECTRICAL

top quality wire it with Amerbestos"

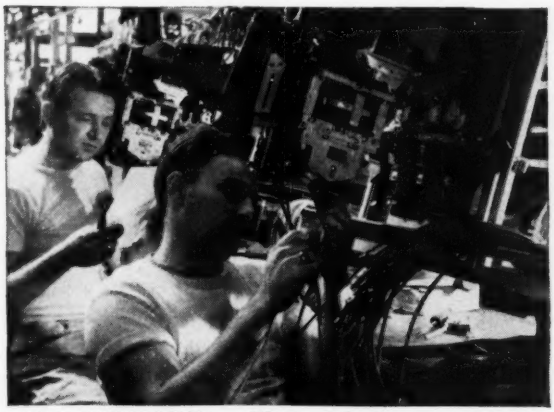
says I-T-E Circuit Breaker Co., Inc., *world-famous switchgear manufacturer*



THIS LOW-VOLTAGE BOILER control switchboard contains 22,000 feet of Amerbestos. It has 11 circuit breakers, is being built for Astoria, N. Y. generating station of Consolidated Edison.



HERE, an electrician wires a 600v I-T-E Multimite switchboard. It has 9 compartments, 7 for circuit breakers, 2 for instruments. Notice extreme flexibility of the Amerbestos wire.



EACH OF THESE I-T-E type KB circuit breakers contain 22 feet of Amerbestos. In this photograph, workmen are wiring the circuit breakers up to the terminal blocks.

UPPER SECTION of this photo is the main power bus on the Consolidated Edison switchboard. Wiring duct cover has been removed to show the 298 wires that occupy the compartment.

SPECIAL Job!

- ▶mold cured portable cord
- ▶machine tool & building wire
- ▶special purpose wire & cable

SEND THE COUPON

American Steel & Wire Division
Room EE-33, Rockefeller Building
Cleveland 13, Ohio

☐ Please give me more information about Amerbestos

☐ I'd like to talk to your representative

Name .....

Firm .....

Address .....

City ..... State .....

WIRE & CABLE

USS

UNITED STATES STEEL

For Most Cable Trough Installations . . .

Our exhaustive list of standard COPE Cable Trough parts can easily be worked into your plans. The simplified design of standard COPE Cable Trough actually saves you three ways — materials, labor and costs.

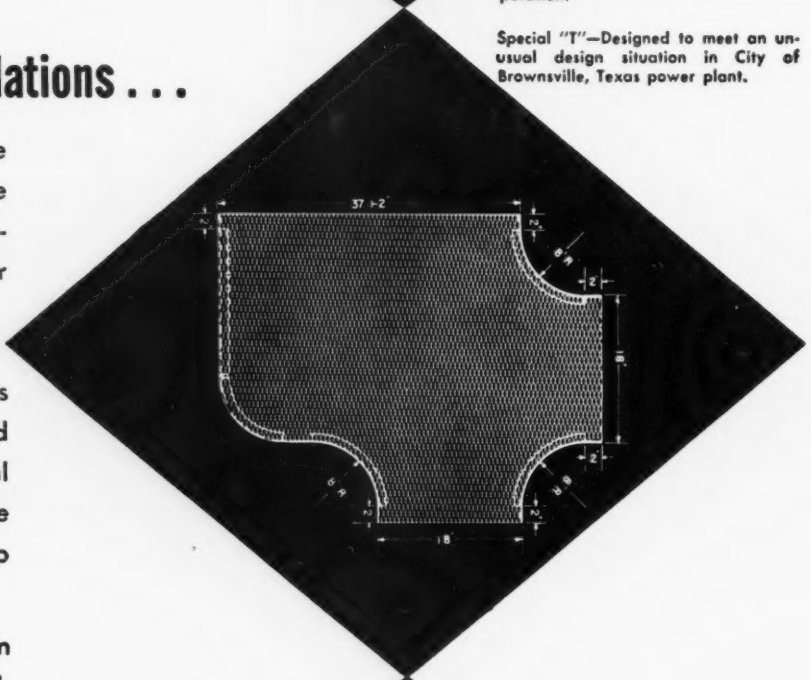
Standard Installation of COPE Trough at Danskammer Point Steam Station, Central Hudson Gas & Electric Corporation.

As Well As . . .

For Unusual Cable Trough Installations . . .

Where the standard COPE Cable Trough cannot answer those "special situations," COPE Engineers will help you with your problem. We will, as we have for hundreds of users, furnish special fittings. All we require is an outline of your problem and we will then design any special fittings necessary to adapt the standard COPE Cable Trough to your specific job.

Please request full information on standard COPE Cable Trough from us today.



Special "T"—Designed to meet an unusual design situation in City of Brownsville, Texas power plant.

T. J. COPE, INC., 711 SOUTH 50th ST.
PHILADELPHIA 43, PENNSYLVANIA

T. J. Cope INC.

You know Cope by these products

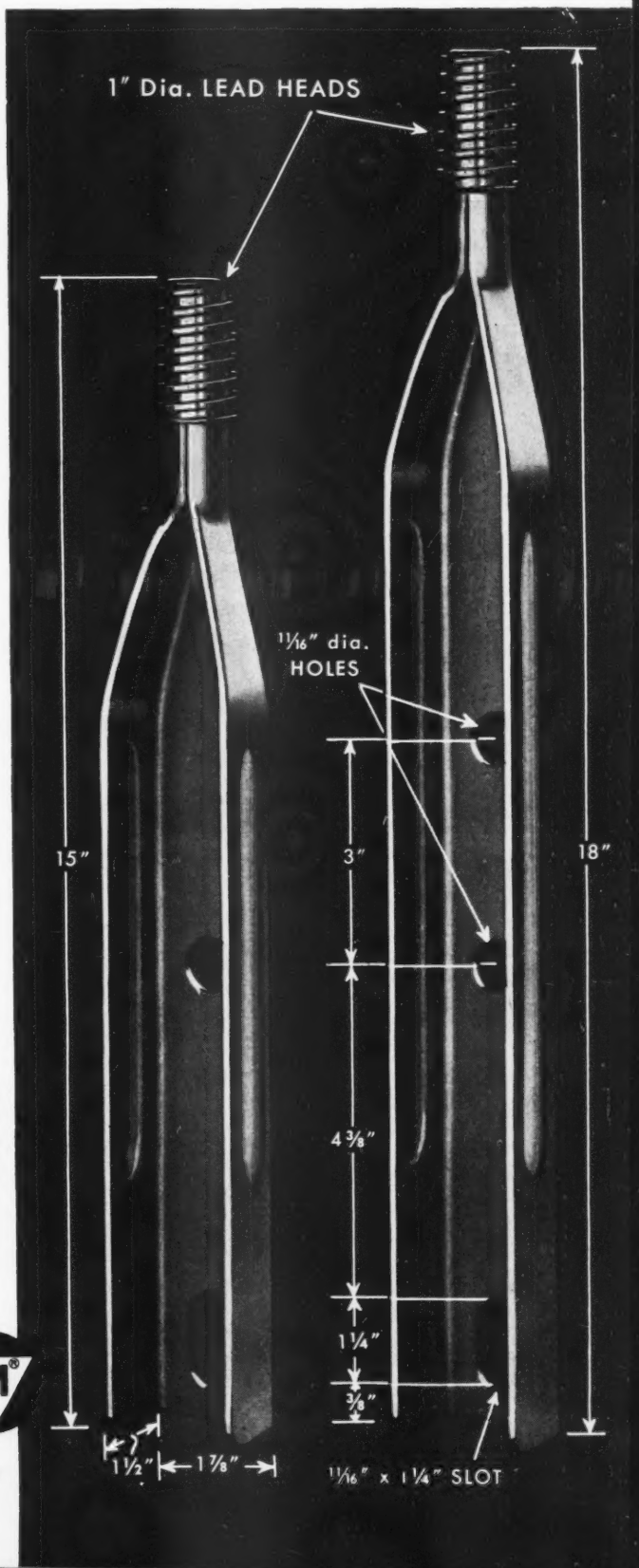
L-M's EEI Specification 15" and 18" Pole Top Pins Ribbed for Extra Strength

L-M's Pole Top Pins redesigned for extra strength. Ribs in the sides of channel section provide additional resistance to deflection. Meet EEI and REA specifications.

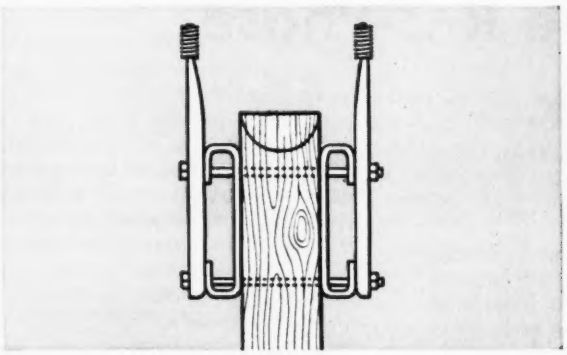
Formed ribs in the sides of the heavy channel steel of L-M pole top pins provide extra strength without adding unnecessary weight.

The pins are available in 15- and 18-inch lengths. The 15-inch pin has 5-inch hole spacing; the 18-inch pin has both 5-inch and 8-inch spacing.

Both pins amply meet the specification of 1500 pounds in transverse loading and 1200 pounds in longitudinal loading. Both are heavy 8-gauge channel steel, hot-dip galvanized.



Meet REA Specifications



The 15- and 18-inch pins meet REA specifications. Also available is L-M's REA-specification 20-inch 1⅜" lead head pole top pin and bracket.

Get Information and Samples

L-M offers a wide variety of Line Construction Materials and specialties to meet almost any problem. These items are stocked in L-M's 40 warehouses all over the country. Ask the L-M Field Engineer for information and samples. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division). 115

LINE MATERIAL

Line Construction Materials

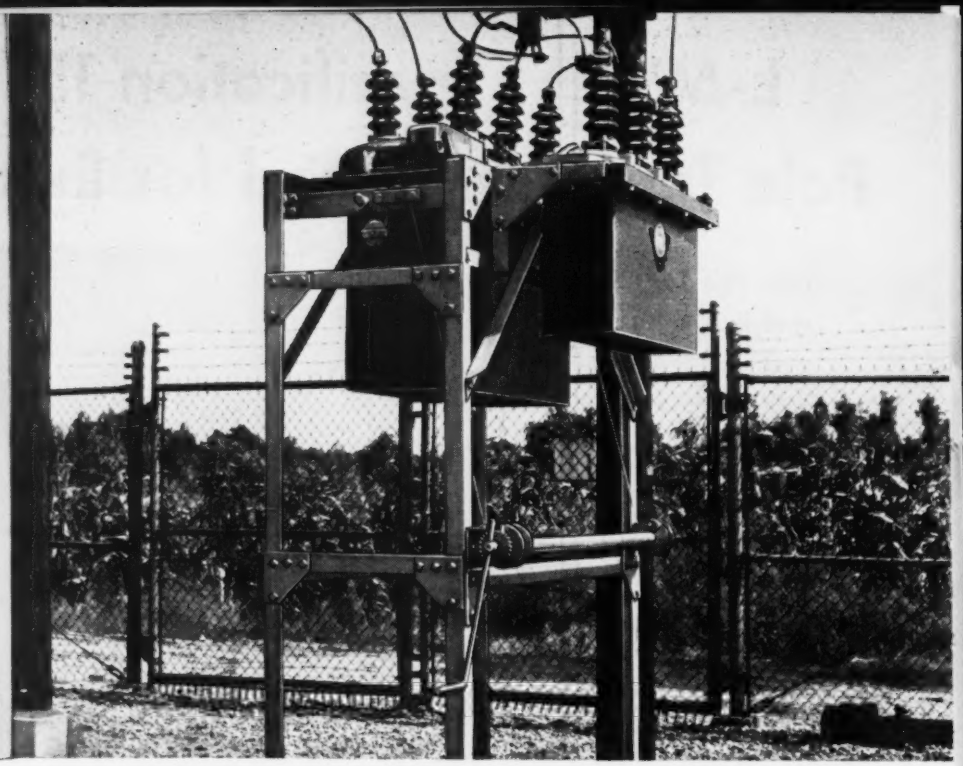
BE CAREFUL. THE LIFE YOU SAVE MAY BE YOUR OWN.

First 3-phase power-class recloser with 100,000 kva interrupting rating.

Completely self-contained unit provides automatic protection of substation feeders at less than half the cost of using substation breakers. Also used on feeder lines with heavy loads and high fault currents.

Available with ground trip solenoid and current transformer.

All three phases trip simultaneously when fault occurs on any one phase, preventing feedback.



The Kyle Type R Recloser at St. Joe substation of Indiana-Michigan Electric Company, Ft. Wayne. The recloser, termed the greatest recloser development since Kyle pioneered dual timing, is available with ground trip solenoid and the current transformer shown here.

Here is L-M's Kyle Type R 3-Phase Heavy-Duty Recloser

By **R. C. KIRK,**
Manager, Kyle Products Sales, Line Material Company

To meet the growing need for power-class protection on 3-phase lines, L-M engineers have developed a heavy-duty recloser that provides simultaneous tripping of all three phases on feeders with heavy loads and high fault currents.

This is a new and very desirable feature in heavy-duty 3-phase reclosers. It prevents high transient voltages sometimes encountered with single-phase switching on delta systems; and on wye systems it prevents feedback which might cause trouble on heavily loaded 3-phase circuits.

6000 Amperes Interrupting Rating

This recloser, known as the Kyle Type R, is a rugged, dependable unit capable of replacing breakers in substations with up to 100,000 kva fault capacity. The recloser is rated 25 to 280 amperes nominal load, trips at from 50 to 560 amperes, and interrupts up to 6000 amperes at 4.8 kv, or 4000 amperes at 14.4 kv.

Ground Fault Tripping

The Type R is available with a current transformer and ground trip solenoid that will trip the recloser at from 50 to 400 amperes.

This new Kyle Type R has been in continuous use in substation and pole line applications of several power companies for a period sufficient to substantiate design calculations and the extensive tests in the "Know House," L-M's short-circuit test laboratory.

Provides Dual Timing

Because it interrupts so much faster than breakers, the Type R permits co-ordination with fuses, eliminating unnecessary fuse blowing on temporary faults and thus substantially reducing service calls.

KYLE Type R Series Trip Coil Ratings

Nominal Load Rating Amperes	Minimum Tripping Current Amperes	Interrupting Rating* Symmetrical RMS Amperes at Maximum Phase-to-Phase Nominal Voltage of: 4.8 kv	14.4 kv
25	50	1500	1500
35	70	2100	2100
50	100	3000	3000
70	140	4200	4000
100	200	6000	4000
140	280	6000	4000
160	320	6000	4000
185	370	6000	4000
225	450	6000	4000
280	560	6000	4000

*Recloser interrupting ratings are based on the maximum test circuit X/R ratio of not less than 8, and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

Closing Solenoid Voltage Ratings in complete range from 2.4 to 14.4 kv.

The 160 and 225 ampere ratings are available for special coordination problems. When either of these two ratings is used in series with other reclosers, minimum trip currents should have a ratio of not less than 1.32 for best coordination.

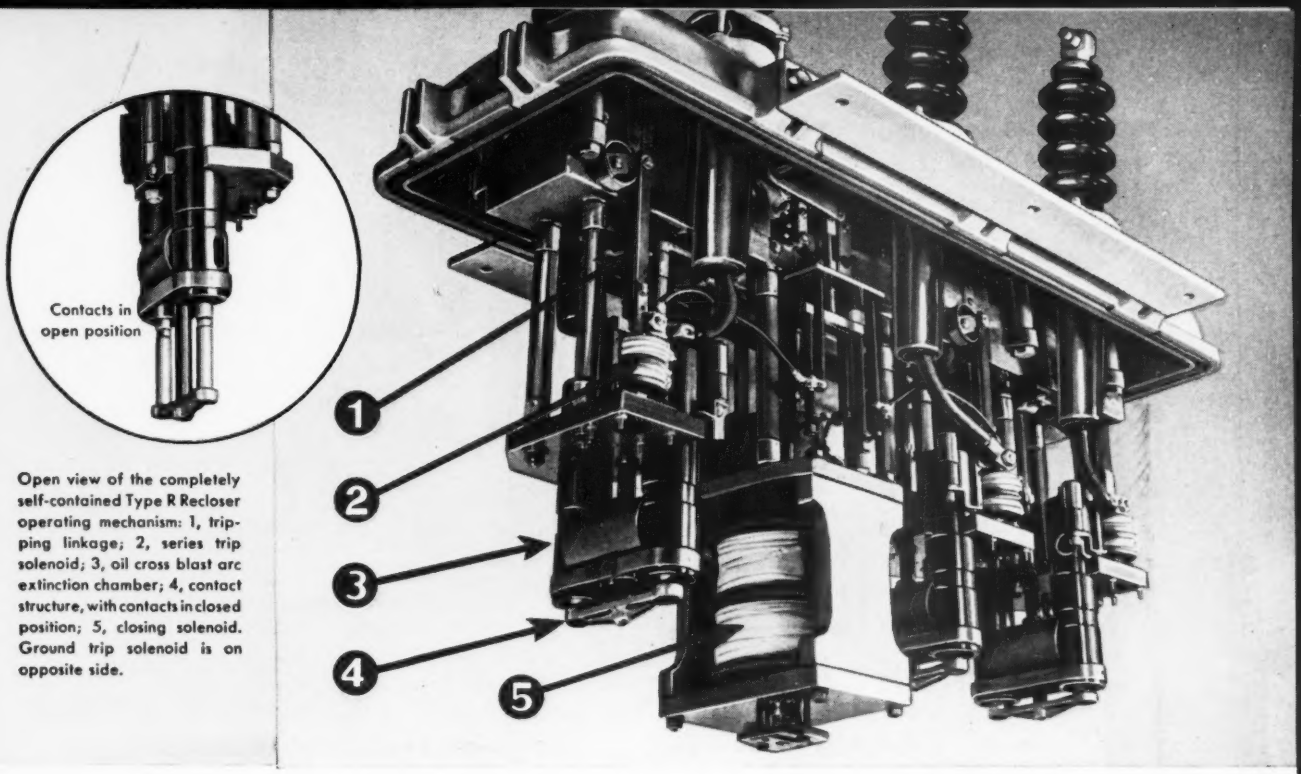
Ground Solenoid Settings: Minimum Pickup Current primary, amperes; 50; 67; 100; 133; 200; 400.

Three time-current curves; A, fast; B, retarded; C, extra-retarded. Available in any of seven sequences.

Trip coils, closing coil, and sequences easily changed in the field.

Insulation Level: full power class; meets ASA, NEMA, AIEE standards for 15 kv station equipment, as follows:

60 cycle one-minute withstand, dry: 50 kv.
60 cycle ten-second withstand, wet: 45 kv
1½ x 40 ms surge withstand (BIL): 110 kv



Open view of the completely self-contained Type R Recloser operating mechanism: 1, tripping linkage; 2, series trip solenoid; 3, oil cross blast arc extinction chamber; 4, contact structure, with contacts in closed position; 5, closing solenoid. Ground trip solenoid is on opposite side.

Applications for the Type R

Because of its operating advantages, the savings it affords in service calls, and its low cost in comparison with substation breaker equipment, this recloser will no doubt replace breakers in many cases. The low cost is possible because the Type R is a single, self-contained unit, designed, manufactured, and tested on a standardized basis, with all the economies this implies. It will also be used in many line locations where heavily loaded 3-phase feeders justify this protection.

Complete Automatic Protection

With this new unit, Line Material now offers a complete range of automatic protection, with both single-phase and 3-phase reclosers, in the entire range up to 6000 amperes interrupting rating at 4.8 kv, and 4000 amperes at 14.4 kv. Thus L-M now provides complete, coordinated automatic protection from substation to load.

DESIGN AND OPERATING FEATURES

Operation completely automatic. On permanent faults recloser opens and recloses three times, and then locks out. On temporary faults the fast openings permit the fault to clear; if it is not cleared, the time delay operation blows the sectionalizing fuse, and the recloser resets itself for another complete cycle. Type of fault—3-phase, single-phase, or phase-to-ground—does not affect the timing.

Time Delay System, located above oil level and is Silicone fluid filled.

Operating curves: A, fast; B, retarded; C, extra-retarded. Seven possible standard sequences or combinations. Sequences easily changed in the field.

Dual Contacts, with oil cross-blast arc extinction which has proved so successful on the Kyle Type L.

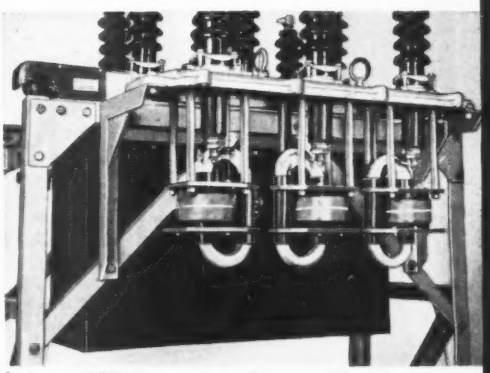
Clamp-on bushings, easily replaced; plated "Universal" terminals for both copper and aluminum, No. 6 solid to 250 MCM stranded conductor.

Kyle non-reclosing feature, for extra safety, standard equipment.

Operating handle, counter, and non-reclosing feature lever easily accessible under sleet hood. Trip-free operating handle.

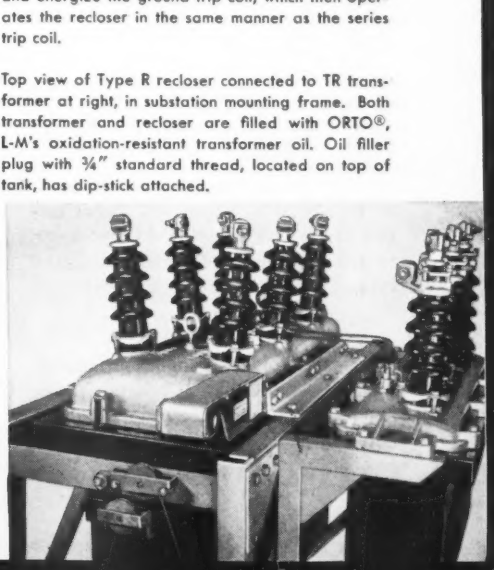
Let Us Answer Your Questions

Ask the L-M Field Engineer for a copy of Bulletin CR1C —or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



3-phase oil-filled current transformer, used with ground trip solenoid for ground fault tripping. Primaries are connected one in each phase through coaxial bushings, and secondaries are in parallel. If the three primaries have unbalanced currents, an unbalanced current will flow in the secondaries and energize the ground trip coil, which then operates the recloser in the same manner as the series trip coil.

Top view of Type R recloser connected to TR transformer at right, in substation mounting frame. Both transformer and recloser are filled with ORTO®, L-M's oxidation-resistant transformer oil. Oil filler plug with ¾" standard thread, located on top of tank, has dip-stick attached.



101

LINE MATERIAL
Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD

LET'S LOOK AT THE FACTS

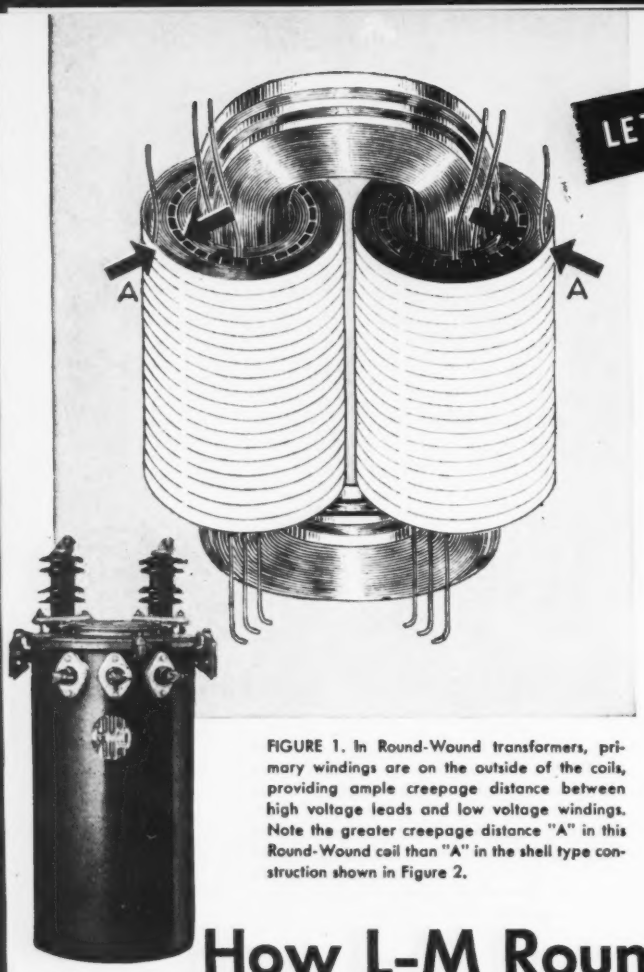


FIGURE 1. In Round-Wound transformers, primary windings are on the outside of the coils, providing ample creepage distance between high voltage leads and low voltage windings. Note the greater creepage distance "A" in this Round-Wound coil than "A" in the shell type construction shown in Figure 2.

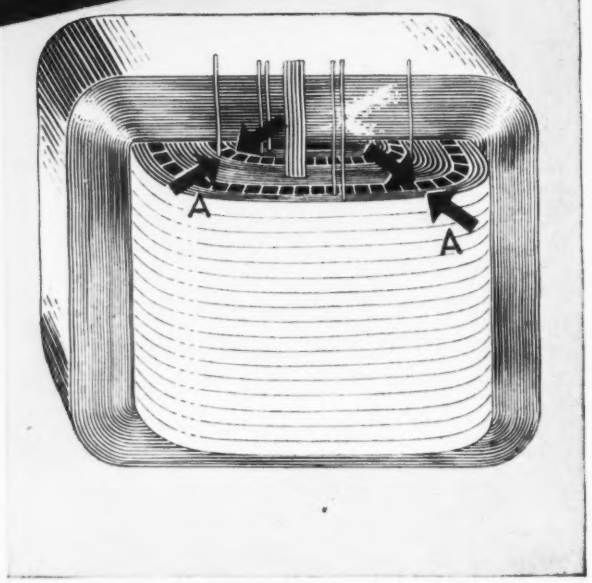


FIGURE 2. In the shell type of transformer, where the primary winding must be sandwiched between secondary windings, and are confined by core steel, primary leads are much closer to the secondary, resulting in far greater danger of flashover. Danger points are the short creepage distances "A" between the high voltage leads and the low voltage windings.

How L-M Round-Wound Design Provides Higher Impulse Level, Higher Short Circuit Strength

by **EARL J. KIRSCH**, Assistant Manager, Transformer Sales, Line Material Company

Both high impulse level and high short circuit strength are desirable characteristics in distribution transformers. A high impulse level will enable a transformer to resist lightning and switching surges of considerable magnitude. Short circuit strength will enable the transformer to withstand the great mechanical forces created by heavy short circuit currents.

High Impulse Level

Principal factors in attaining high impulse levels are the insulation between winding layers and the creepage distances between leads, windings, and frame. Lightning surges attempt to flash over or through insulation to the ground.

A particularly weak point in many transformers occurs across the end-coil surfaces where leads are brought out of the coils. As shown in Figure 1, it is a characteristic of the Round-Wound type of design that there is substantially more clearance between leads than is obtained with the one-coil shell type shown in Figure 2, where primary winding is often sandwiched between two layers of secondary, and more closely confined by core steel.

Core Versus Shell Type

In the L-M Round-Wound transformer, all of the primary winding is on the outside of the secondary winding. Leads are taken from the outside layer of the primary winding to the primary bushing, providing maximum creepage and flashover distances (Figure 1). In the shell type (Fig. 2), the designer must sandwich the primary winding between two layers of secondary to gain minimum acceptable clearance between the high voltage primary and the core, and to hold the impedance within acceptable limits.

Another problem is that surges tend to "pile up" on the end-turns nearest the bushing—which is why so large a percentage of burnouts occur at this point. Because of the design of the Round-Wound transformer, there is maximum separation of primary windings from ground, and maximum insulation between high and low voltage windings and between coils.

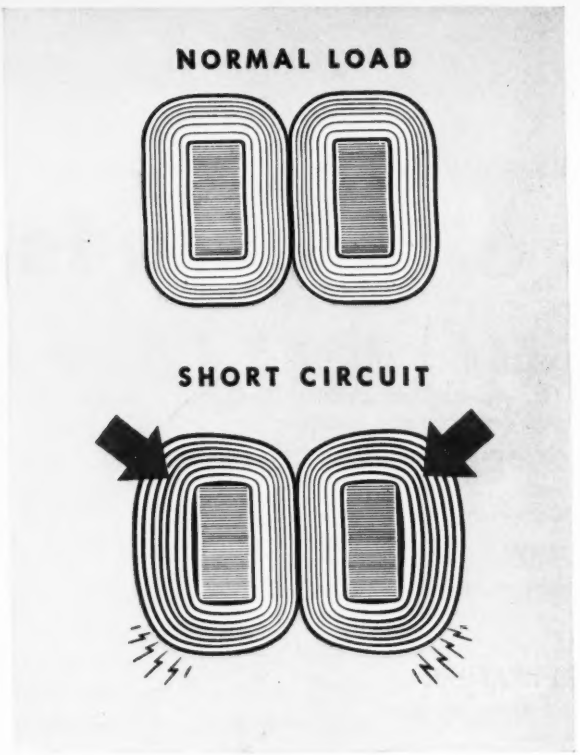


FIGURE 3. Under short circuit currents, rectangular coils tend to distort to a round shape. The forces may be violent enough to damage insulation or even cause complete failure of the coil.

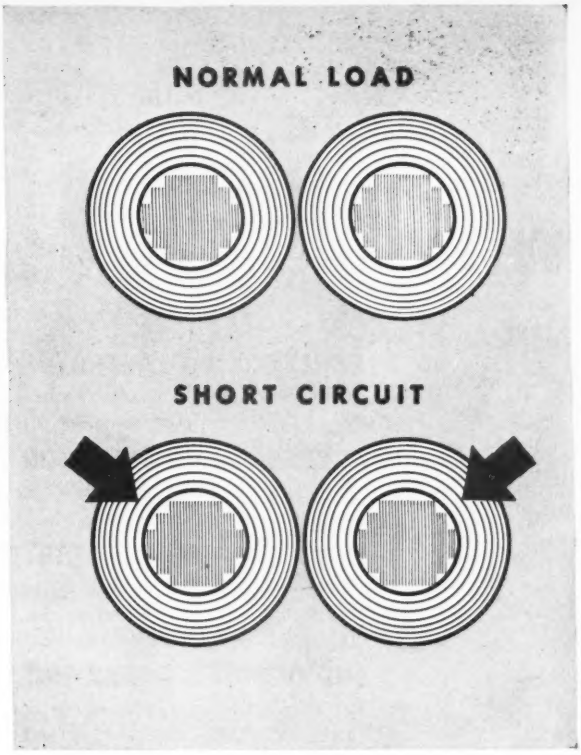


FIGURE 4. Since the coils on Round-Wound transformers are already round, short circuit currents produce very little distortion. Thus "Round-Wounds" have appreciably higher short circuit strength.

The fact that the Round-Wound coils are *round* means that they have not been malleted into a rectangular shape; there are no sharp corners and weak spots caused by damage to the insulation from malleting.

Basic design, plus generous insulation, assures the exceptionally high impulse strength of Round-Wound transformers that is proved not only in laboratory tests but also is borne out by long life performance in actual field service.

Short Circuit Strength

The round coils of the Round-Wound transformer are also a principal factor in the outstanding short circuit strength of this design. As shown in Figure 3, when rectangular coils are short-circuited, the heavy currents tend to force the windings into circular shape. This is very likely to result in damage to the insulation.

But round coils, already circular, are not stressed out of shape, and therefore are not subject to distortion and resulting damage (Figure 4). Thus round coils, plus substantial coil bracing, give Round-Wound transformers inherent advantages in short circuit strength, which contributes materially to their longer life.

Because of their design characteristics, and because of the elimination of variables in production, L-M Round-Wound transformers amply meet NEMA standards with a generous margin of safety.

For Complete Engineering Data

Ask the L-M Field Engineer for the information you want, or write Mr. Kirsch at the Transformer Division, Line Material Company, Zanesville, Ohio (a McGraw Electric Company Division).

Some Outstanding Characteristics of L-M Round-Wound Transformers

High Short Time Overload Capacity

Better Regulation at all power factors

High Impulse Level, with ample creepage distances and generous insulation

High Short Circuit Strength because round coils have less tendency to distort

Low Exciting Current because the core is not cut or disturbed after annealing

Better Loss Ratios with lower total losses

88

LINE MATERIAL

Transformers

Complete Coordinated Equipment for Distribution Today

"Round-Wound" is a Line Material trademark.

why PENETROX is

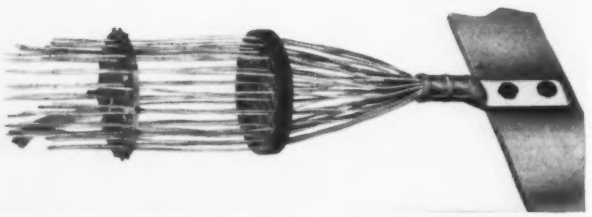
PENETROX A PENETRATES OXIDE FILM
on aluminum cable strands by means of *keying action* of zinc particles, providing numerous low-resistance current paths between conductor and connector.

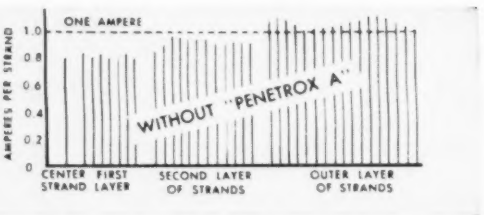
PREVENTS RE-FORMATION OF OXIDE FILM, PREVENTS CORROSION
by completely sealing the joint with a protective coating — the viscous petrolatum carrier, stable over a wide temperature range.

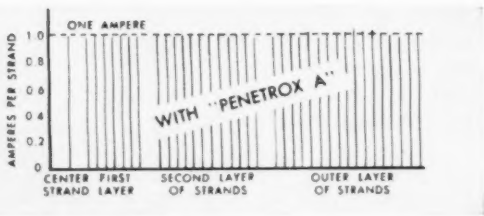
EQUALIZES CURRENT DISTRIBUTION
through reducing interstrand resistance. Under compression, zinc granules cut through oxide film, provide numerous current-carrying bridges between conductor strands.

AND REDUCES OPERATING TEMPERATURE
by insuring high-conductance current paths between conductor and connector and between conductor strands.

INTERSTRAND RESISTANCE TEST...







INTERSTRAND RESISTANCE TEST . . .
measures current in 37 strands of 500 Mcm aluminum cable, separated by insulator as they leave the aluminum terminal. Current fed through plate is measured through each strand, by the millivolt drop method. With PENETROX A in the joint, current distribution is equal in all 37 strands. Without PENETROX A, interstrand resistance causes uneven current distribution, which may lead to local heating of individual strands under full electrical load. See bar charts at right.

5-YEAR ROOF EXPOSURE TEST...

5-YEAR ROOF EXPOSURE TEST . . .
in highly-corrosive industrial atmosphere demonstrates corrosion-inhibiting characteristic of PENETROX A. Clean, bright area of aluminum cable had been enclosed in tin-plated copper alloy terminal and sealed with PENETROX A.

For complete, authoritative information on connectors and installation techniques consult Burndy Catalog AL53, "Connectors for Aluminum Cable in Overhead Distribution".

essential to ALUMINUM joints

To insure electrical stability of all joints involving aluminum, Burndy PENETROX A is a *necessity* during connector installation. This has been demonstrated repeatedly by impartial investigations in the laboratory and in the field... by prominent utilities and aluminum producers, as well as by Burndy.

These investigations prove conclusively that PENETROX A is the *most effective* installation compound... *because*

- **PENETROX A penetrates oxide film during installation of the connector, provides innumerable current-carrying bridges in the joint, seals the joint against air, moisture, and corrosive atmosphere.**

- **Joints made with PENETROX A have higher conductivity, operate cooler, resist oxidation and corrosion, and perform better, longer.**

Burndy compression-type connectors for aluminum come factory-filled with PENETROX A. For clamp- and split-bolt types and for A.C.S.R. splices PENETROX A is available in collapsible tubes with convenient nozzle; in pint, quart, or gallon cans.

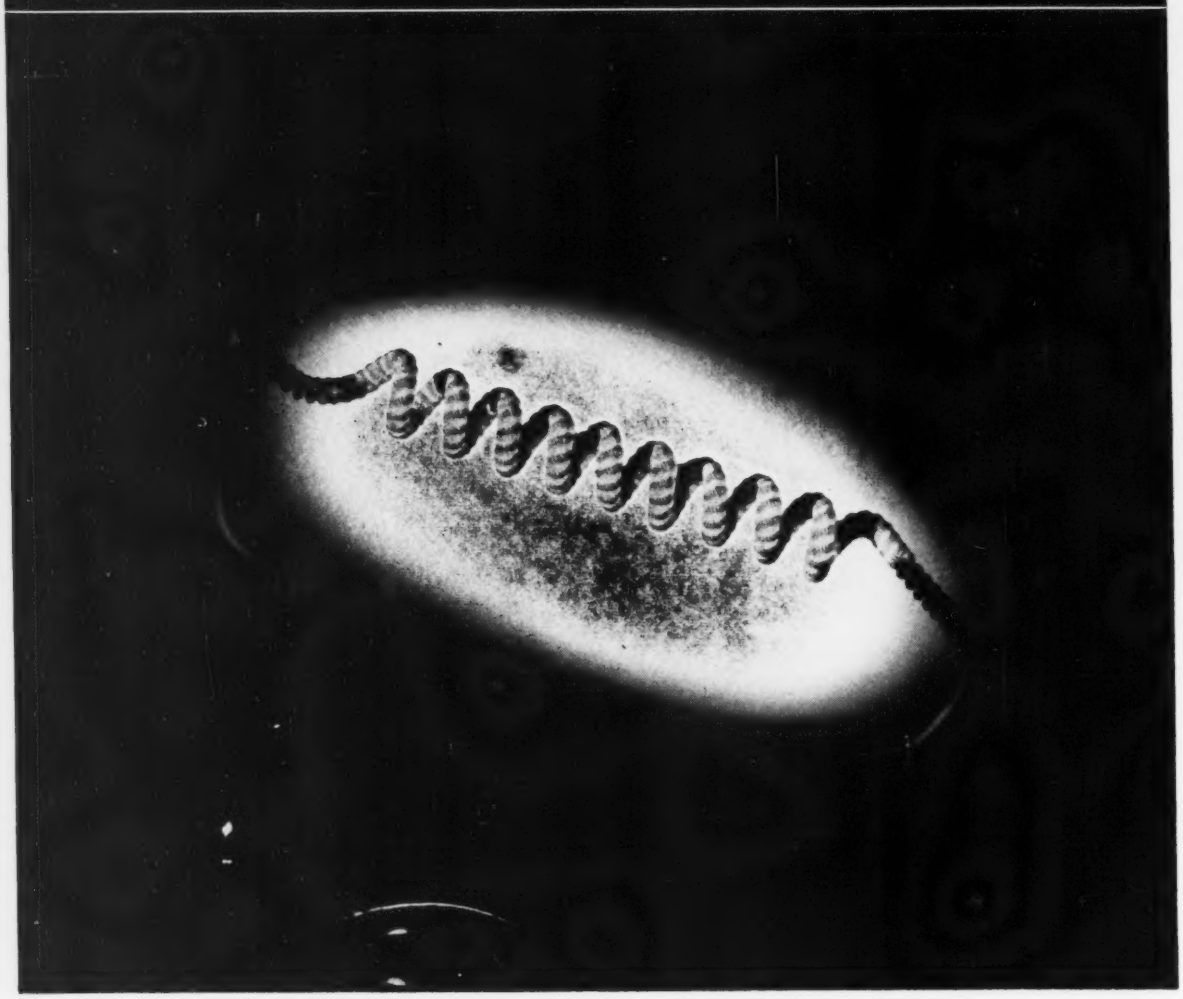
BURNDY

NORWALK, CONNECT. FACTORIES: New York • California **TORONTO, CANADA**

EXPORT: Philips Export Corporation

53-1

You expect the best value from G-E fluorescent lamps



Extra twist squeezes more light from G-E slimline lamps

The electron flow that lights a fluorescent lamp is started by a special chemical mix held on tungsten filaments at each end of the lamp. How long the lamp lasts depends in part on how long the chemical clings to the filament. In most lamps, the filament is twisted into a double coil, to hold a quantity of the mix in a firm grip.

General Electric goes a step further by giving the double coil a third twist — making a triple coil. Used in G-E slimline and other G-E instant-start lamps, the triple coil holds more mix, and holds it more firmly. It gives you extra light for your money because it makes the lamps last longer. This is another example of why you can expect the best value from G-E fluorescent lamps.

You can put your confidence in —

GENERAL ELECTRIC

Automatic Control

• Permutit motor operated valves make regeneration of the Mixed Bed Demineralizer completely automatic. This gives more positive control . . . eliminates the dangers of costly human errors—and takes less time . . . saves man-hours formerly spent in regeneration. In a recent installation for a 1450 psi boiler, two compact Permutit Mixed Bed units fill all make-up requirements . . . supply demineralized, silica-free water continuously and automatically—even if one unit is out of service. What better way to eliminate boiler scale and silica deposits on turbine blades!

MINERAL IMPURITIES REACH VANISHING POINT

An almost infinite number of ion exchange steps take place simultaneously in the homogeneous mixture of anion and cation exchangers. Result—mineral content so low that conventional water analysis methods fail. Effluents of Permutit Mixed Bed units have contained *total* electrolytes as low as 0.01 ppm, and silica as low as 0.01 ppm. Under service conditions, values may be slightly higher. (Most distilled water contains 2 to 10 ppm electrolytes . . . costs much more to produce.)

TWO AMAZING RESINS DO THE JOB

Highly efficient Permutit Q and Permutit S do the whole job under positive automatic control in the Mixed Bed Demineralizer. Permutit Q is a high capacity hydrogen cation exchange resin that is extremely resistant to wide pH ranges, high temperatures, and oxidizing conditions. Permutit S, a strongly basic resin with a high reaction rate, reduces silica to a range far lower than previous methods.

New Booklet—DEMINERALIZATION BY ION EXCHANGE

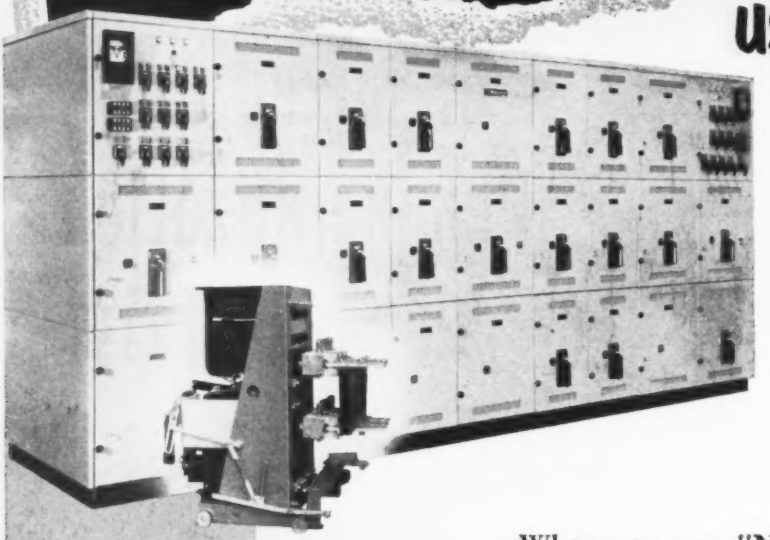
This interesting new bulletin describes the key methods of demineralizing water and removing silica by ion exchange.

For your copy, write to: THE PERMUTIT COMPANY, DEPT. EW-5, 330 WEST 42ND STREET, NEW YORK 36, N. Y., or Permutit Company of Canada, Ltd., 6975 Jeanne Mance Street, Montreal.

PERMUTIT®

ION EXCHANGE AND WATER CONDITIONING HEADQUARTERS

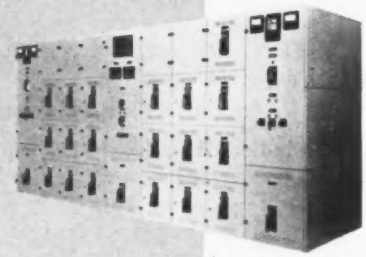
For Power Distribution use "NEMCO" CLASS 722



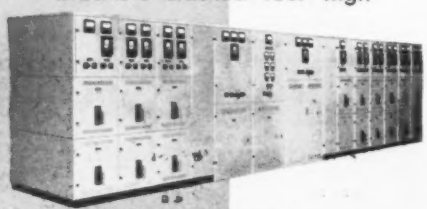
LOW VOLTAGE METAL-ENCLOSED DRAWOUT SWITCHGEAR

15 to 6,000 Amperes Continuous
15,000 to100,000 Amperes I. C.
600 Volts A-C, 250 Volts D-C

Weatherproof Switchgear Unit



Assembly with 15,000 A.I.C. breakers stacked four high



Assembly with 2,000 Ampere and 4,000 Ampere Breakers

When you use "NEMCO" low voltage, metal-enclosed, air circuit breaker drawout switchgear, you gain in many ways.

MINIMUM INSTALLATION EXPENSE is assured because "NEMCO" gear is factory-assembled and factory-tested, then is shipped to your plant site as a *complete* unit, ready for service!

MAXIMUM SERVICE CONTINUITY is assured through the use of interchangeable air circuit breakers which are mounted on carriages that roll on wheels, permitting breakers to be withdrawn and replaced quickly.

REFINEMENTS IN CONSTRUCTION include: extra-rigid self-supporting frames; concealed door hinges; silver plated bus connections; and handsome, durable finish applied to "Paintlok" steel.

Furnished for indoor or outdoor service, "NEMCO" low voltage switchgear meets NEMA, AIEE and ASA specifications and is custom-built to each customer's requirements. Write for valuable, 12-page, descriptive bulletin.

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

217 N. DETROIT AVE. TELEPHONE 2-5131

ANACONDA FORUM
for the Electrical Industry

THE IMPORTANCE OF
PRODUCTION METHODS ANALYSIS
IN INDUSTRY

by Robert G. Ely, Vice President
The Connecticut Light and Power Company

LOWER production costs, always a major concern of industrial management, have, due to inflationary pressures during the past several years, become the vital element of survival in our competitive markets. Fortunately better production methods, coupled with enlightened depreciation practice that provides for prompt replacement of obsolescent productive equipment, enable our industrial customers to stay in the race. And fortunately, America's engineers are past masters at continually developing better production methods. The pioneering work of Dr. Frank Gilbreth in time and motion study laid the groundwork for a fascinating field of engineering encompassing the fundamentals of continued profitable operation in any industrial activity—that of Production Method Analysis.

FROM RAW MATERIAL TO FINISHED PRODUCT

Production Method Analysis studies the operation from raw material to finished product—the method of handling materials, the sequence of operations and their logical physical relationships, the individual operators and their activities. It also studies bottlenecks of production, such as poor or obsolete equipment, inadequate wiring with its consequent voltage problems and decreased production rates, inadequately trained personnel, or lack of proper tools. In short, Production Method Analysis breaks down apparently complex operations into their simple component parts. From such analyses and the subsequent use of modern, high-speed, automatic machines properly tooled and in proper sequence, along with effective materials handling and efficient personnel who know their jobs, comes the healthy industrial employer who is so vital to the well-being of the community and, incidentally, to the utility serving that community. And therein lies our very real interest in Production Method Analysis.

INDUSTRIAL PAYROLLS VS. UTILITY INCOME

There is no mathematical sleight-of-hand involved in developing the relationship of industrial payrolls to utility income in any community or group of communities. Unable to pull up poles and move to where the grass may look greener, and confined to its franchise territory in its quest for new business, the utility's prosperity directly reflects the general prosperity of its service area. Lower production costs, therefore, become of vital concern to us as well as to our customers. Production Method Analysis as a tool in increasing production rates and reducing unit costs has therefore become part of our vocabulary, part of our thinking, part of our program of doing our utmost to help our manufacturers maintain and improve their competitive positions within their own industries.

ELECTRICAL EQUIPMENT PLAYS A PART, TOO

Our allies in the electrical equipment field have an important part in this program too. This is for the reason that better production methods depend on the availability of a sufficient supply of power in the right place at the right time, ready for application to the job of increasing the effectiveness of manhours through efficient transformation into mechanical or heat energy for the accomplishment of industrial tasks. Generating stations, transmission and distribution systems, adequate plant wiring and well engineered utilization equipment are all necessary parts in the over-all picture of industrial and community growth and health. All who have a part in the supply of these facilities strengthen the backbone of better production methods.

ANACONDA JOINTING KITS prevent the possibility of inadequate materials . . . keep stocks fresh and readily available for fast withdrawals. Illustration shows how complete these kits are—right down to a handy checklist of materials.

ANACONDA CABLE ACCESSORIES

A complete line—engineered by power-cable experts—is available in increased quantities.

At Anaconda, the increase in demand for cable accessories is being met by increased production. The complete line—with many exclusive features—consists of the following:

Potheads (capnut, switchgear, transformer, disconnect and through types), featuring unmatched interchangeability of parts.

Unit Packages of Jointing Materials. These kits contain everything needed to make a joint.

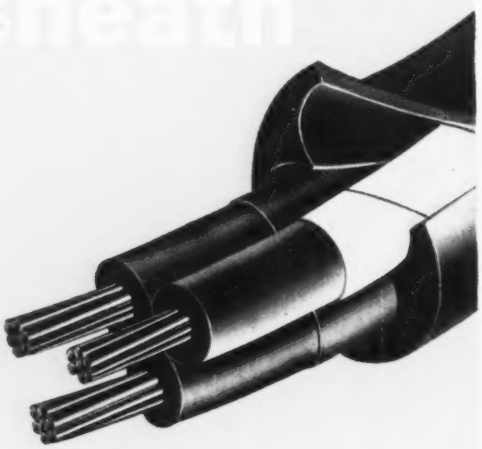
Filling Compounds. Balanced compounds mean greater stability.

Cable Paints and other miscellaneous accessory items.

Bring your cable and cable accessories problems to your Anaconda Representative.

Durasheath

the *all-purpose* ANACONDA Cable for both power and lighting services



Durasheath's* tough neoprene jacket stubbornly resists electrolysis, corrosion, temperature extremes, cutting, abrasion, impact, flame, oil, grease, moisture and most soil acids and alkalies.

Run it overhead, in ducts, or buried underground—or all three in one continuous run.

It's flexible, easy to handle, economical to install; made in single or multi-conductor construction.

Your nearest Anaconda Sales Office or Distributor can show you why it's good business to install this versatile, all-purpose cable. Just ask them.

*Trademark

TEN BASIC RULES FOR INDUSTRIAL WIRING

BY FRANK AIME, veteran electrical engineer of Anaconda Wire & Cable Company.

Successful operation of an industrial plant depends on the quality of its electrical distribution system. These rules should help in setting up a well-planned system for both large and small plants:

1. Design the system within supply limitations.
2. Locate supply near electrical load centers.
3. Know your load requirements.
4. Let requirements of processes, production and relative importance of the major characteristics of distribution systems determine distribution system type.
5. Select and arrange feeders and equipment so that interruptions never occur more than the process will allow.
6. Select all components from source to load for reasonable future growth.
7. Don't be limited by National Electric Code figures for conductors, conduit and protection which are minimum and primarily for safety.
8. Use load centers when feasible.
9. Select cables with best all-around characteristics for your condition.
10. Aim always for production efficiency, quality and safety.

ANACONDA RESEARCH AT WORK

How a new problem meant a new product

The problem? Loads had outgrown duct space and duct sizes of lead-covered cables. Cables had to be run hotter and under more severe physical difficulties. Cable *sheaths* were failing before *interiors* . . . cable life was limited.

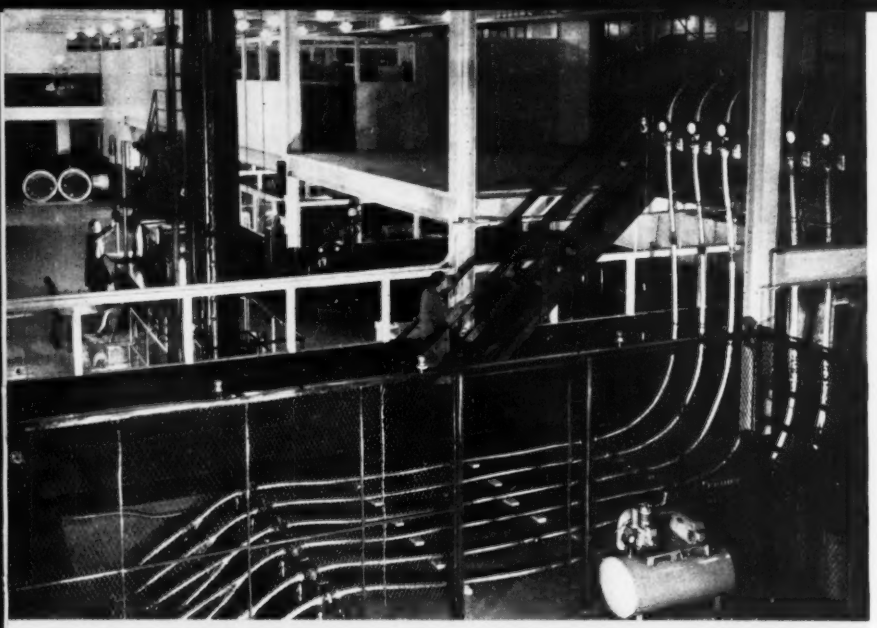
Anaconda research set out to find the answer. Hundreds of sheath alloys were tested. The one finally selected promised far better performance. Called ANACONDA F-3† alloy-lead sheath, it has a high burst strength and a low creep rate . . . resists bending and does not age-harden.

Once again, Anaconda's planned program of research solved a new problem with a new product. Yes, research like this pays off . . . in cable that serves you better!

RESEARCH IS ANACONDA'S BUSINESS, TOO!

†*F-3 Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.*

ANACONDA®



CYCLIC AGING TEST. Here's one method Anaconda Engineers use to learn how lead-covered, paper-insulated cables stand up. In this laboratory, cables are loaded under conditions similar to daily load cycles in the field, but at higher temperatures and voltages. Result: Anaconda Engineers get the facts fast . . . know what can happen years hence . . . and can give you much more reliable performance data.

WHY THIS MAN'S JOB MEANS BUILT-IN QUALITY IN THE CABLE YOU BUY

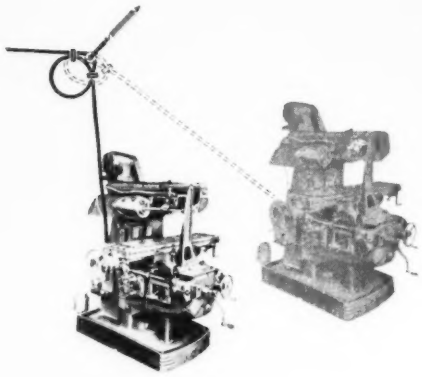
THIS IS ED GITTLESON, Anaconda's Chief Inspector and Manager of Quality Control.

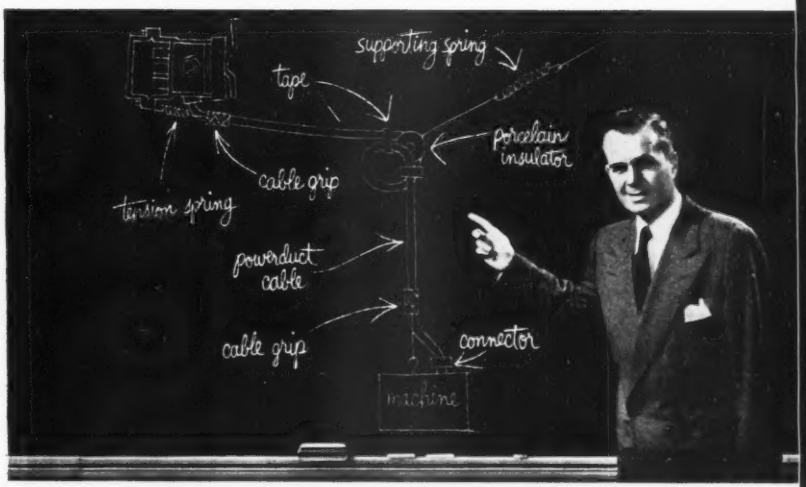
Ed knows that to make a good product and sell it at the lowest possible price, quality must be built in right from the start. That's Ed's job—to see that it's done from raw material to final shipment. Ed has based Anaconda's control program on principles of statistical quality control that assure you not only of *greater* uniformity, but of a *higher level* of quality as well. You can be sure that every Anaconda product more than complies with your requirements.

No busduct system is truly flexible without this

New ANACONDA® Powerduct Cable

It's the only nonmetallic-armored busdrop cable UL approved for this hard use; cuts cost of relocating machines.





Even if you have a modern busduct system, it may be flexible only so far as it goes. You may still have to rip out permanent or semi-permanent wiring every time you rearrange important machines. That's costly.

Why not match your busduct system with money-saving ANACONDA Powerduct Cable . . . approved by Underwriters' Laboratories, Inc., for busway branches under section 3646, 1951 National Electric Code?

Powerduct Cable is much cheaper to install than conduit. It handles easily. Grips prevent cable creep. No time is lost. You get circuit capacity at any point for any load at any time. Coil (see illustration) makes local changes easy.

Its tough jacket takes heavy mechanical abuse, is flame-retardant, won't fray. Cold-flow is no problem. Cutting compounds, oil, acid, water, grease won't harm it.

Plan now to add flexible Powerduct Cable to your busduct system. Be sure that you insist on the ANACONDA Trademark—your positive proof of UL approval for this use.

the right cable for the job

SHORTS THAT MAKE SENSE

PRODUCTION TOOL. Good lighting is important in any plant. With it—high quality, profitable production and fulfilled schedules are possible. Without it —spoilage, reduced efficiency, lowered quality control and poor morale may send costs skyrocketing.

ADEQUATE CIRCUITS. A lighting system is no better than the circuits that serve it. Lamp efficiency, for instance, depends on operation at rated voltage. Make sure your circuits are adequate.

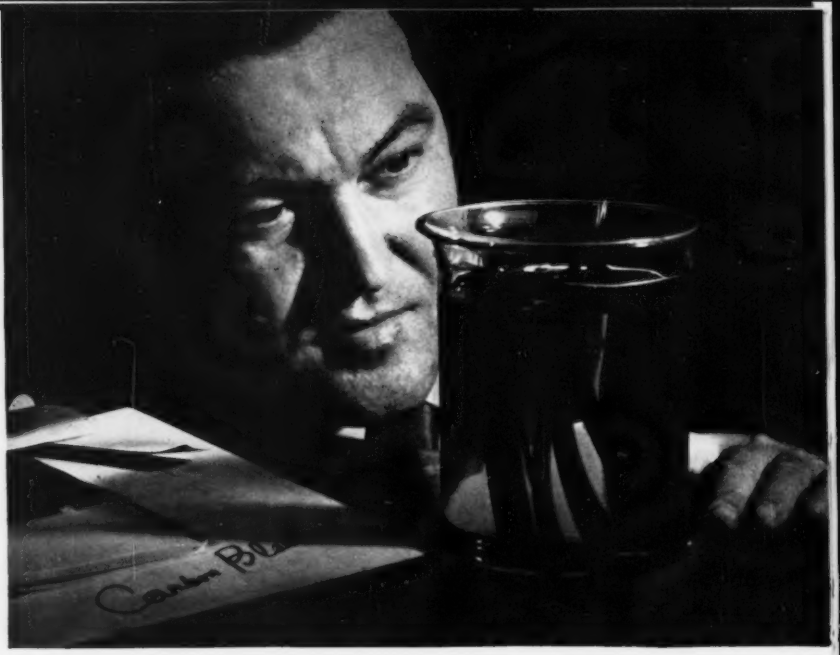
PLANNED SYSTEM LAYOUT. Lack of planning never pays off. A well-designed system always costs less than a poor one. Plan for tomorrow and you cut tomorrow's costs *today*.

TOMORROW'S LIGHTING NEEDS. Many plants install lighting circuits in working areas for an ultimate of two times present lighting intensity. Play smart and follow suit. You won't be caught with your lighting down.

CURRENT RATING. No one value of current-carrying capacity (amperes) can be assigned to any one size and design of cable. Installation and method of operation must be considered.

CABLE TERMINATIONS. Moisture, like death and taxes, plays no favorites. In making cable terminations, it pays to keep this in mind—even at low voltages. There tightness against moisture is just as important as for higher ratings. Yet it's here that failures are far more frequent. Probably due to the feeling that here anything will do in the way of terminating the cable.

OVERHEAD VS. UNDERGROUND. For appearance' sake only, overhead distribution systems are often replaced by more expensive underground systems. But it's entirely possible such a change will also result in a lower annual cost. Reason: freedom from damage by trees, wind, sleet, ice, etc. Reliability is improved.



"LIVE" INSULATING OIL

Heat and electrical stress produce deterioration products which eventually sign the death warrant for insulating oil. Carbon black keeps such oil "alive." It minimizes and removes deterioration products and keeps them outside the field of the dielectric. It continually purifies and stabilizes the oil . . . keeps it clean.

Only ANACONDA Type CB* Power Cable utilizes this phenomenon. Result: greater stability and longer life. This tested paper cable may be obtained with special carbon black binder which adds resiliency, yet possesses adequate strength. A further improvement, F-3** Alloy-Lead Sheath, triples sheath life by its high resistance to slow-bending fatigue, creep, burst and abrasion.

If you're not using Type CB Power Cable, you aren't getting as much service out of your paper cables as you should. We suggest you get the full story from your nearest Anaconda Sales Office.

* CB—Carbon Black (U. S. Patents 2,102,129, 2,405,853) Reg. U. S. Pat. Off.

** F-3—Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.

FOR FURTHER INFORMATION about any product mentioned in the pages of this advertisement, see your Anaconda Representative . . . or write to *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

ANACONDA®

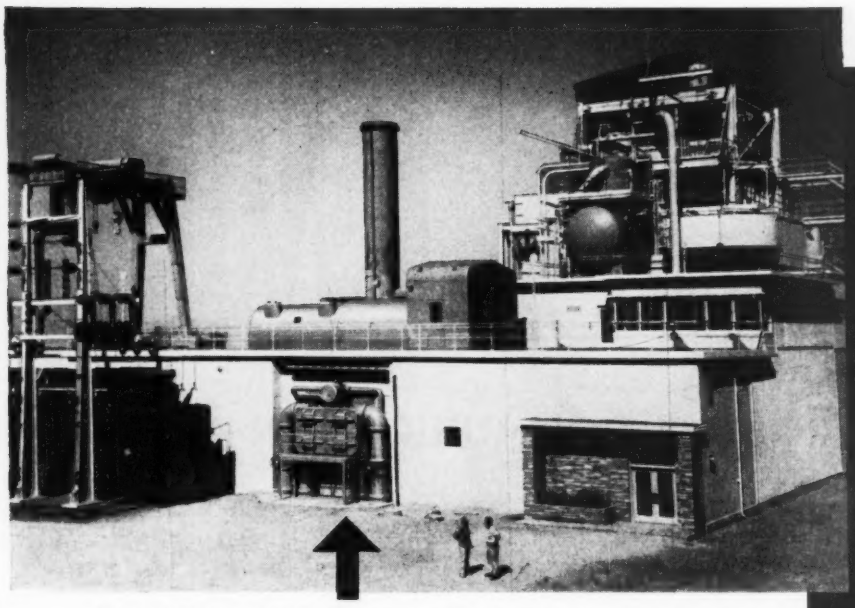
TODAY'S HEADQUARTERS FOR WIRE AND CABLE

MAKERS OF

building, barn, machine tool, control and communication wire • service and overhead distribution cables, bare and weatherproof including ACSR • portable cords and cables • power and bus-drop cables • mine, bridge, aerial, underground, duct, network and submarine cables • parkway, airport and street-lighting cables • station, apparatus and vertical-riser cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

53382

Salt River Power District Installs I-R Rectangular Condensers in unique, outdoor-type steam plant



NEW KYRENE POWER PLANT, designed to take advantage of Arizona climate conditions, saves valuable under-turbine space with **Ingersoll-Rand Rectangular Condensers**

This 27,500 sq. ft. I-R Rectangular Condenser serves Unit No. 1, a 30/33,000 kw turbine-generator, at the new Kyrene Steam Plant of the Salt River Power District.

The new Kyrene Steam Plant, near Phoenix, Arizona, is the latest addition to the Salt River Power District's combined steam, hydro and diesel power generating system.

Designed and built by the Bechtel Corporation, the Kyrene Station differs from the conventional outdoor installation in that the maintenance shops and auxiliary equipment are under cover for the comfort and convenience of operating personnel. All other elements of the station are of the outdoor type resulting in maximum economy of construction for the Arizona climate.

Unit No. 1—a 30/33,000 kw turbine-generator with throttle conditions of 850 psig, 900F—is supplied by a 350,000 lb. per hr. steam generator, designed to burn natural gas automatically, fuel oil manually, or coal or lignite on conversion. The turbine is served by an Ingersoll-Rand Rectangular Condenser containing 27,500 sq. ft. of cooling surface. Condenser cooling water is handled by two I-R vertical pumps handling 25,800 gpm. Condensate is handled by I-R vertical pumps.

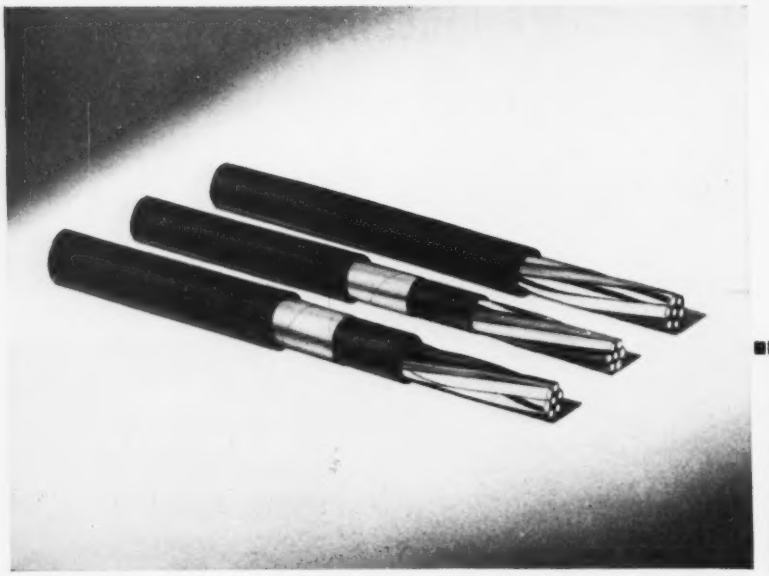
Unit No. 2, now under construction, will have a rating of 60/66,000 kw. It will be served by a 47,500 sq.ft. I-R Rectangular Condenser, also of two-pass and vertically divided design. The condensate and circulating pumps will again be supplied by Ingersoll-Rand.

These Ingersoll-Rand Condensers save valuable space because their *rectangular design* makes the most efficient use of the rectangular space available below the turbine. And installation cost is minimized because they are completely assembled in the shop, then shipped in large sections, completely flanged for easy erection without any field fitting or strength welding.

Ingersoll-Rand

868-4 11 BROADWAY, NEW YORK 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES



THESE THREE ARE "A NATURAL"

for LOW COST, TROUBLE-FREE OPERATION of SIGNAL, CONTROL and COMMUNICATION CIRCUITS

Here's a list of the top quality benefits you get when you buy Simplex Polyethylene-Plastex Signal Cables. For more complete information send for our newly-revised Simplex catalog #1010 in care of the address below.

POLYETHYLENE INSULATION

- High Dielectric Strength
- Low Dielectric Constant
- Low Power Factor
- High Insulation Resistance
- Good Physical Properties
- Low Water Absorption
- Resists Oils, Chemicals, Sunlight, Aging
- Low Cracking and Shattering Temperatures
- Resists Deformation
- Permits Use of a Thin Wall

PLASTEX JACKET

- Tough yet Flexible
- Low Cracking Temperature
- Wide Temperature Range
- Resists Abrasion, Oils, Chemicals, Flame, Sunlight, Aging
- Low Water Absorption and Diffusion

COMPLETED CABLE

- Small in Diameter
- Light Weight
- Low Capacitance and Attenuation
- Electrical and Mechanical Stability
- Comes in Three Types Shown Above for Duct, Underground and Aerial Service

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

4 powerful reasons why 1953 CHEVROLET Advance-Design Trucks give you more of what you want

MORE POWER—GREATER ECONOMY! Expect a wonderful advance in power, performance and economy in Chevrolet heavy-duty trucks! The great 1953 Loadmaster engine—standard on 5000, 6000 Series, heavy-duty and forward control models, optional on 4000 Series heavy-duty trucks—has a new high compression ratio of 7.1 to 1, develops even more horsepower than before. And the Thriftmaster engine in light- and medium-duty models brings you traditional Chevrolet economy.

TRUCKS ENGINEERED FOR YOUR PAYLOADS! Chevrolet trucks are designed for the job they will do—engineered from tires to axle, springs, clutch and power plant to do that job with the greatest efficiency and lowest cost. You don't waste money on too heavy a truck or too light a truck. You buy the *right* truck for *your* job!

MORE STAMINA! More strength where strength counts most! In 1953, all Chevrolet trucks have stronger, brawnier, more rigid frames. They have heavier, sturdier construction that means a longer, lower-cost life for your truck. And they have new larger, safer, longer lasting brakes on many models, too!

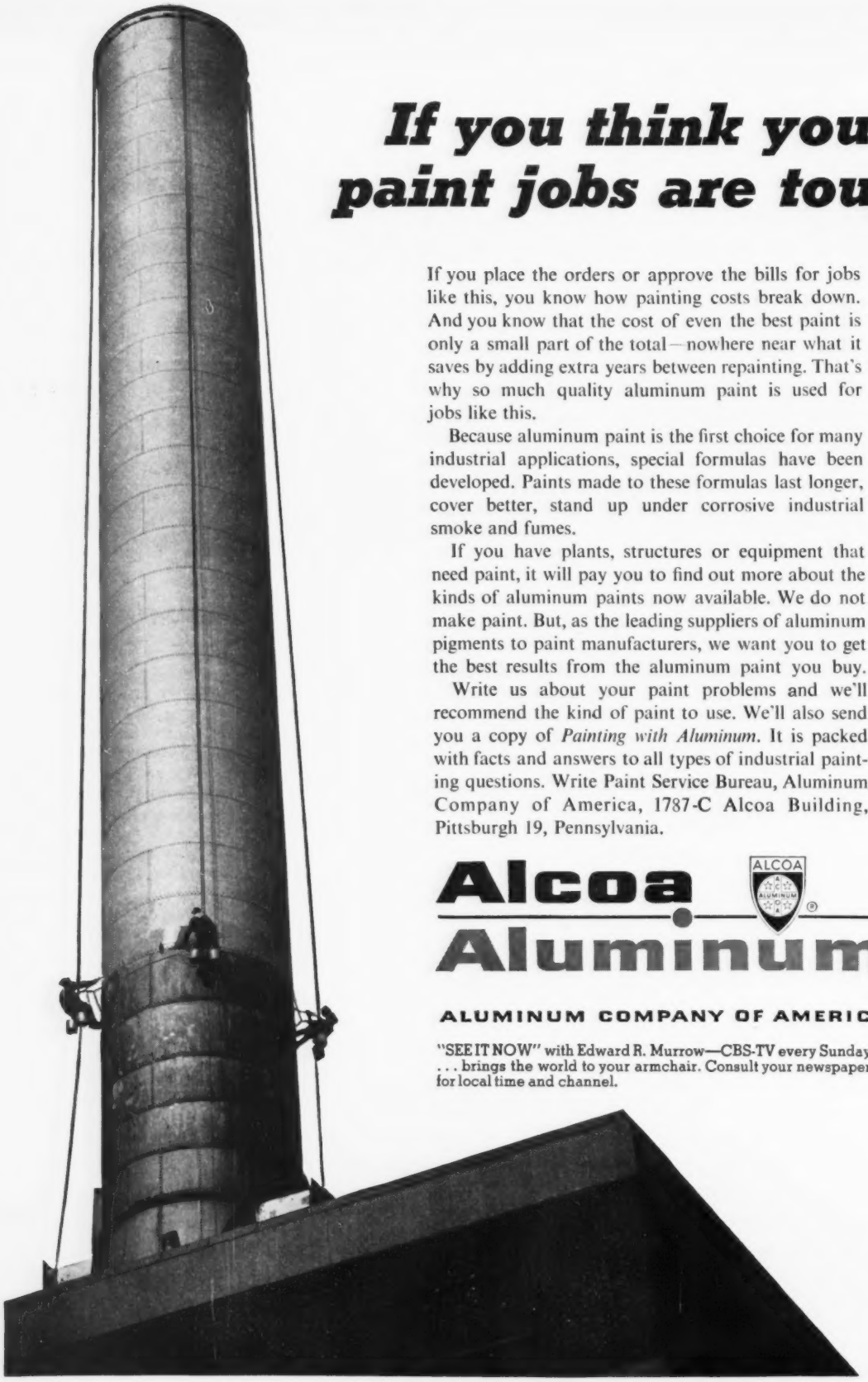
GREAT TRUCK FEATURES! In addition to the many *NEW* things you'll find in these 1953 Chevrolet trucks, you'll also find many great features yet unmatched by other makes of trucks. Features such as Flexi-Mounted Cabs, Unit-Designed Bodies, Ball-Gear Steering and many others help make Chevrolet Advance-Design trucks your greatest buy. Chevrolet Division of General Motors, Detroit 2, Michigan.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTI-PANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

CHEVROLET

first in demand in value in sales



If you think your paint jobs are tough

If you place the orders or approve the bills for jobs like this, you know how painting costs break down. And you know that the cost of even the best paint is only a small part of the total—nowhere near what it saves by adding extra years between repainting. That's why so much quality aluminum paint is used for jobs like this.

Because aluminum paint is the first choice for many industrial applications, special formulas have been developed. Paints made to these formulas last longer, cover better, stand up under corrosive industrial smoke and fumes.

If you have plants, structures or equipment that need paint, it will pay you to find out more about the kinds of aluminum paints now available. We do not make paint. But, as the leading suppliers of aluminum pigments to paint manufacturers, we want you to get the best results from the aluminum paint you buy.

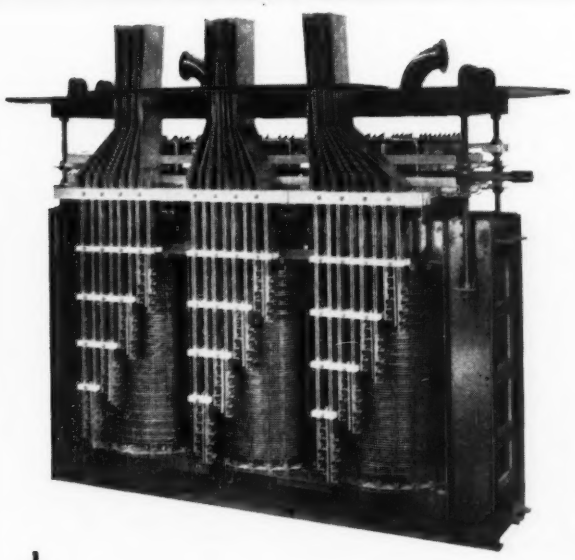
Write us about your paint problems and we'll recommend the kind of paint to use. We'll also send you a copy of *Painting with Aluminum*. It is packed with facts and answers to all types of industrial painting questions. Write Paint Service Bureau, Aluminum Company of America, 1787-C Alcoa Building, Pittsburgh 19, Pennsylvania.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

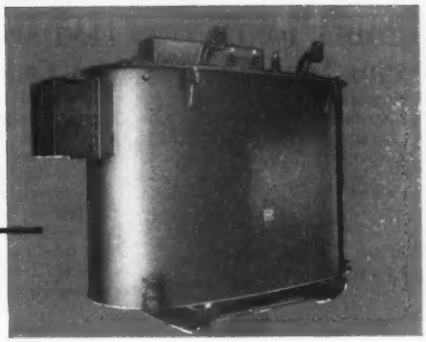
"SEE IT NOW" with Edward R. Murrow—CBS-TV every Sunday . . . brings the world to your armchair. Consult your newspaper for local time and channel.

100 kva...25,000 kva...or higher...



Pennsylvania can build a Furnace Transformer for any size electric furnace

25,000 Kva Furnace Transformer, Low Voltage Side. 3 Phase, 60 Cycles, Water-cooled. High Voltage: 13800 volts. Low Voltage: 430 to 290 volts.



External view of transformer. Compartment on left houses motor-operated tap changer.

The successful operation of Pennsylvania Furnace Transformers and their industry-wide acceptance indicate that Pennsylvania engineers fully understand the application of furnace transformers to electric furnaces.

For example, in 1936 Pennsylvania introduced a new type of helical winding in the low voltage coils of a 2500 Kva furnace transformer. Since then, the same principles of coil design have been incorporated into Pennsylvania furnace transformers totaling over 1¼ million Kva. In all the intervening years, there has *never* been a low voltage winding breakdown on any of these furnace transformers.

Because its engineering is basically and fundamentally correct, Pennsylvania can build furnace transformers for any size electric furnace now being manufactured or being contemplated for future construction.

Pennsylvania TRANSFORMERS

Furnace Transformer Experts

Pennsylvania TRANSFORMER COMPANY

CANONSBURG, PENNSYLVANIA

Greater Pittsburgh District

BIDDLE *Instrument News*

- ELECTRICAL TESTING INSTRUMENTS
- SPEED MEASURING INSTRUMENTS
- LABORATORY & SCIENTIFIC EQUIPMENT

JAMES G. BIDDLE CO., 1316 ARCH ST., PHILADELPHIA 7, PA.

ACCESSORY PICKUP LOOP DEVELOPED for use with BIDDLE IMPULSE CABLE FAULT LOCATOR

In locating faults on buried cables there are cases where records of the exact location of the cable itself are questionable, and the problem becomes one of tracing the cable as well as locating the fault.

The standard iron-core pickup coil supplied with the detector for the Biddle Impulse Cable Fault Locator was designed and intended for use in duct line construction where it is placed directly on the cable in manholes or at terminations. It is not very convenient to use on the surface of the ground in tracing the location of a buried cable.

A pickup loop has been developed, as shown in the accompanying photograph, which is not only more convenient to use in following buried installations, but is more critical of any change in direction of the cable. It can also be used to estimate the depth of a cable by placing it on both sides of the cable run and noting the degree of tilt required to obtain a maximum signal.

This loop is a simple device consisting of a composition board about ¼" thick shaped as a trapezoid and about 23" wide and 16" high. The pickup coil is wrapped in a groove around the edge of this board. A supply lead is connected to it which is plugged into the detector in place of the standard pickup coil. In use, the detector is carried around the neck by using the carrying strap, the loop with its adjustable handle carried in the hand, and the signal observed on the detector as the operator walks along the location of the buried cable.

NEW BIDDLE IONIZATION TEST SET

For Testing Transformers, Cables, Capacitors . . .

. . . and other electrical components for ionization starting voltage at 60 cycles. Ionization, corona and radio noise are synonymous in describing the phenomena which occurs when a high voltage gradient applied to voids in a dielectric causes ionization of the gas in those voids. The result is electrical disturbance and possible damage to insulation. The Biddle ionization test set offers a decided advantage in practical testing in that it makes possible the grounding of one terminal of the component under test.

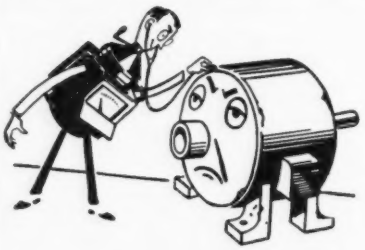
The set includes all necessary connecting leads and accessory mercury oil terminal for use in testing samples of shielded cable. Model 1 rating ¾ KVA at 20 KV. also available with 5 KVA intermittent rating.

Write for **Bulletin 66-10-W.**

JAMES G. BIDDLE CO.

- ELECTRICAL TESTING INSTRUMENTS
- SPEED MEASURING INSTRUMENTS
- LABORATORY & SCIENTIFIC EQUIPMENT

1316 ARCH STREET
PHILADELPHIA 7, PA.



GET YOUR COMPLETE FILE OF HELPFUL BULLETINS ON *ELECTRICAL PREVENTIVE MAINTENANCE*

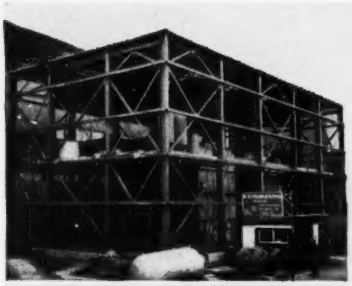
Written by practical electrical men

Check and mail this list with your business letterhead.

- ☐ **Bulletin 21P8**—"The Story of Electrical Insulation Resistance"
- ☐ **Bulletin 21P9**—"Maintenance of Industrial Electrical Equipment"
- ☐ **Bulletin 21P10**—"Cut Electrical Breakdowns"
- ☐ **Bulletin 21P11**—"Getting the Most From Insulation Resistance Measurements"
- ☐ **Bulletin 21P12**—"Preventive Maintenance of Electrical Equipment"
- ☐ **Bulletin 21P16**—"Motor Maintenance with a Check Chart for Alternating- and Direct-Current Motors"

B-912-W

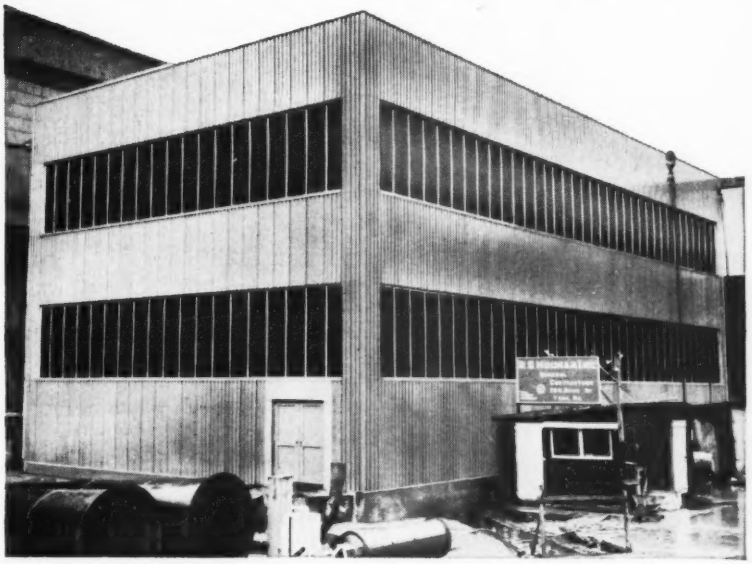
You can tell from Megger® Insulation Tester readings if insulation is going bad before it breaks down. Periodic readings provide the means for keeping your finger on the pulse of your electrical equipment. Saves time and repair bills.



This addition to steam generating facilities at Olmsted Air Force Base, Middletown, Pa., is sided with panels of U·S·S 17 Stainless Steel. The building is shown above before installation of panels and at the right as it nears completion. Architect-Engineer: Gannett, Fleming, Corddry & Carpenter, Inc., Harrisburg, Pa. General contractor: R. S. Noonan, Inc., York, Pa. Stainless Steel panels fabricated and erected by H. H. Robertson Co., Pittsburgh, Pennsylvania.

Using lightweight, long-lasting, insulated building panels

Complete walls of U·S·S 17 *(Type 430)* Stainless Steel installed in 11 working days



MORE than 7,000 square feet of U·S·S 17 Stainless Steel insulated panels form the complete walls of this new building which is an addition to existing steam generating facilities at the jet engine overhaul line at Olmsted Air Force Base, Middletown, Pa.

These Stainless Steel panels were installed by a crew of eight men in only 11 working days. One group of four men removed the protective paper and drilled the panels, and a second group of four men removed the girts and bolted the panels into place.

Quick installation like this—*in any weather*—means much lower labor costs. And that's but a part of the dollars-and-cents advantage of using Stainless Steel panel construction.

In the long run, the durability and corrosion resistance of Stainless Steel walls, the light weight in comparison to conventional building materials, the low "U" value or heat transmission factor all indicate that the cost-per-year will be lower than many building materials that may have a slightly lower initial cost.

Best news of all is that U·S·S 17 Stainless Steel for walls is available *now* for use on your current projects. You can obtain it without CMP tickets for use on any authorized construction.

If you are planning a new power plant or other type of building, U·S·S 17 Stainless Steel deserves your careful consideration. If you'd like additional information, write for our book, using the coupon below. Remember, United States Steel only produces the Stainless sheet and strip from which panels of this type are made; the panels themselves are fabricated by a number of our customers whose names will be sent you on request.

The 24″ wide Stainless panels backed with 1½″ Fiberglas insulation and a metal-coated steel inner plate are attached to the building's structural members by four ⅜″ x 3″ round-head Stainless Steel bolts.

Unitd States Steel Corporation
Room 2811-T, 525 William Penn Place, Pittsburgh 30 Pa.

☐ **Please send me your booklet, "U·S·S 12, U·S·S 17 Stainless Steel Walls and Roofs for Industrial Buildings."**

☐ **Please arrange to have fabricators of Stainless Steel wall panels send me literature on their particular type of construction.**

Name ..... Title .....

Address .....

City ..... State .....

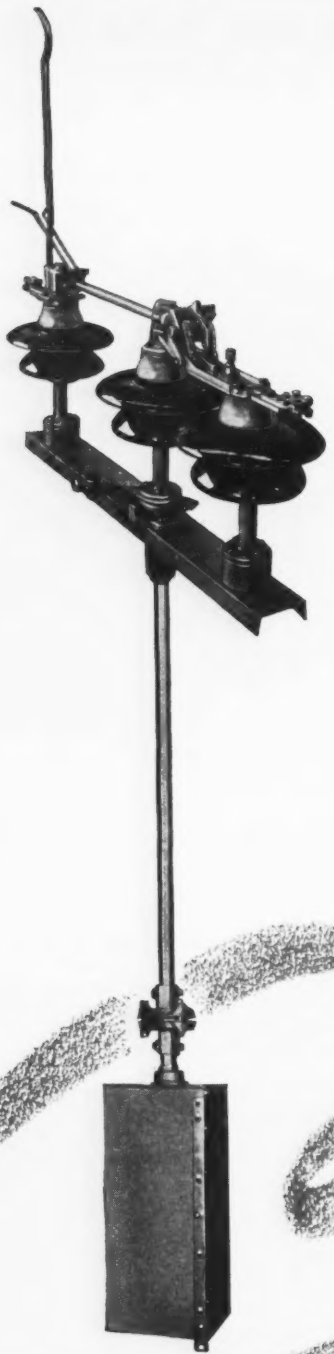
UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

2-1255

UNITED STATES STEEL



New-

★ A completely dependable, automatic operating mechanism for air-break switches, it requires no outside source of power. It draws current from a battery to actuate the solenoids and relays. It uses the instantly available pressure of compressed nitrogen to open and close your switches.

This new mechanism is adaptable to a variety of chores. Use it to sectionalize transmission lines . . . disconnect branch lines . . . transfer loads from one power source to another. Or you can make any variation on these three basic schemes by using standard relays. The current for the relay coils is .6 amperes at 6 volts.

Maintenance of this new mechanism is easy. Routine inspection will tell you when to change gas cylinders. But you can figure on 30 to 40 complete operating cycles before that's necessary. The battery recommended will hold 85% of its charge for a whole year, and will last about ten years.

Let your Joslyn Representative give you the whole story. Call him today or write: Hi-Voltage Equipment Company, 4000 East 116th Street, Cleveland 5, Ohio.

HI-VOLTAGE

Gas-Operated Mechanism

HOW IT WORKS

1-The mechanism is energized for operation by a relay or a pushbutton.

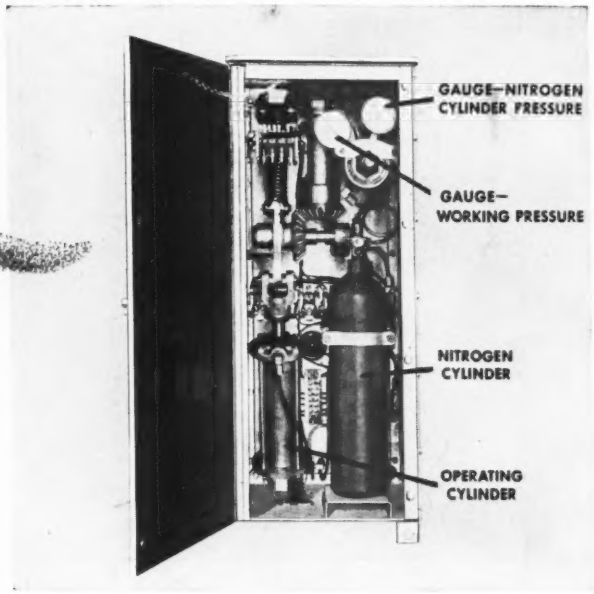
2-Main magnetic valve opens.

3-Either opening or closing valve opens simultaneously with main valve.

4-Gas is admitted at either one end or the other of the operating cylinder. Adjustable needle valves regulate the speed.

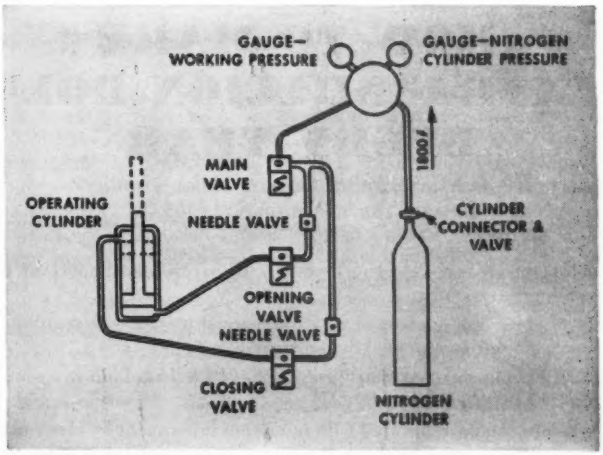
5-Limit switches deenergize valves at end of operation and set circuits for next operation.

Note: For emergency operation, the mechanism may be fitted with a handle for manual control.



SPECIFICATIONS

- Size: 32" high, 13" wide, 13" deep.
- Two sizes of operating cylinders available to provide 310 or 400 ft-lbs of operating effort.
- Operating time—3 seconds.
- Stainless steel spring holds switch in open or closed position.
- Completely enclosed in a heavy-gauge metal case.



EQUIPMENT COMPANY

4000 EAST 116TH STREET · CLEVELAND 5, OHIO

Commercial Cooking Success Story...

HOW TO MAKE AN "EXTRA" MILLION DOLLARS EVERY YEAR

By J. M. Stedman, General Sales Manager, Pennsylvania Power & Light Co.

Five years ago Pennsylvania Power & Light Co. discovered an important new source of revenue—commercial cooking.

Today it is one of our major sources of new commercial income—accounting for 8% of all revenues derived from our commercial department.

In actual worth, the commercial cooking business that PP&L has built in 5 short years is now valued at well over $1,000,000 annually.

We believe this record can be duplicated with minimum investment by many utilities. Details of our own program are related in the column at the right by Ed Werley, our commercial sales manager.

With the addition of one man, this program was accomplished with our regular field force. This organization was already in contact with the commercial and institutional market in our area—and it was necessary only to direct their attention and emphasis toward the lucrative and untapped cooking load.

In all probability, a similar opportunity exists in many other utility territories.

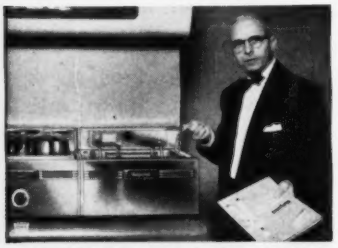
Hotpoint ALL-ELECTRIC Commercial Cooking

HOTPOINT CO. A DIVISION OF GENERAL ELECTRIC COMPANY

"HERE'S HOW WE ADDED A MONEY-MAKING 12,776 KW's IN ONE YEAR,"

says E. P. Werley, Commercial Sales Manager

"IT STARTED WITH 10 HOTPOINT FRY KETTLES which PP&L purchased as demonstrators. That gave real impetus to our commercial cooking business, and we added Nick Patnay as cooking supervisor. Every time one of our commercial representatives promotes the sale of one of these $100 counter-size kettles, we estimate an annual revenue of $90 from that piece of equipment.



"NOW WE KEEP A COMMERCIAL COOKING DISPLAY IN 24 OF OUR DISTRICT OFFICES. We've found that displays in all of our stores excited interest and brought in profitable business without much effort or expense on our part.

"IN 5 YEARS WE SOLD 432 COMPLETE ELECTRIC KITCHENS LIKE THIS ONE AT MERCY HOSPITAL IN WILKES BARRE. Demonstrations helped us do the job. All in all, our commercial cooking program has added over 10,000 KW's per year, and we're looking forward to even bigger, better loads in the future."

☆ ☆ ☆

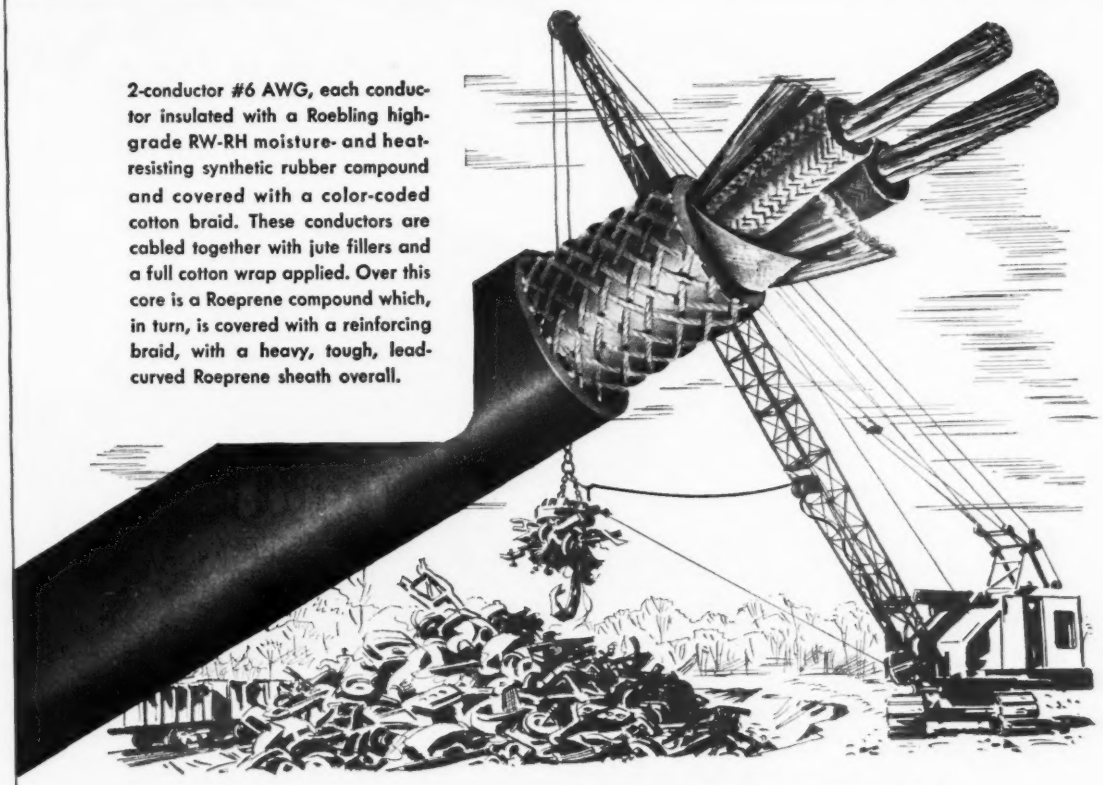
You've read the success story of the Pennsylvania Power & Light Company and Commercial Cooking. We can help you write one like it for yourself. Just send me a letter indicating your interest.

Orrin E. Wolf

Orrin E. Wolf, Vice President
Hotpoint Co.
Commercial Equipment Dept.
265 South Sealey Avenue
Chicago 12, Illinois

ROECLAD PORTABLE POWER CABLES

2-conductor #6 AWG, each conductor insulated with a Roebling high-grade RW-RH moisture- and heat-resisting synthetic rubber compound and covered with a color-coded cotton braid. These conductors are cabled together with jute fillers and a full cotton wrap applied. Over this core is a Roeprene compound which, in turn, is covered with a reinforcing braid, with a heavy, tough, lead-curved Roeprene sheath overall.



Roebling Roeclad Lifting Magnet Cables outlast all others 2 to 1

Roebling Roeclad Lifting Magnet Cable is engineered and produced to withstand rough treatment and to give long service life. The design of this cable is based on field experience of more than 30 years.

Exhaustive tests performed in Roebling laboratories to prove the superiority of Roeclad Lifting Magnet Cables included fatigue and impact tests of representative samples.

In a fatigue test, cable samples after being subjected to more than 2,000,000 reversals—half at room temperature and half at 0°F.—showed no damage to either of the two conductors.

In impact tests, it required over 3000 blows of a 20-lb. weight dropped 5½ inches, 25 times per minute, to cause failure of a two-conductor #8 AWG Roeclad Lifting Magnet Cable.

And a report from an engineering company which has a large number of machines equipped with magnets is typical of the entire field... that Roeclad Lifting Magnet Cable out-performs competitive cables by at least 2 to 1.

Through unending research and development, Roebling's complete electrical line is constantly being improved. You can always buy Roebling with assurance of top efficiency and economy. John A. Roebling's Sons Corporation, Trenton 2, N. J.

Subsidiary of The Colorado Fuel and Iron Corporation

ROEBLING

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST & 5 PITTSBURGH ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST & 120 S. HEWITT ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • PITTSBURGH, 1301 CLARK BLDG • ROCHESTER, 1 FLINT ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • ST. LOUIS, 3001 DELMAR BLVD • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

made to last longer...

KNOX high voltage insulators

No. 81022

KNOX HI-LINE HARDWARE

No. 6206A-U
SUSPENSION CLAMP

No. 7206
SUSPENSION CLAMP

No. 5000
STRAIN CLAMP

Build your next high voltage line with KNOX Insulators . . . you'll find they are rugged and dependable . . . made to last longer. Companies installing KNOX Insulators and Hi Line Hardware agree they get superior service and performance regardless of weather conditions. KNOX Insulators are quality made and rigidly inspected to meet laboratory tests and specifications. Our ample stocks insure PROMPT delivery.

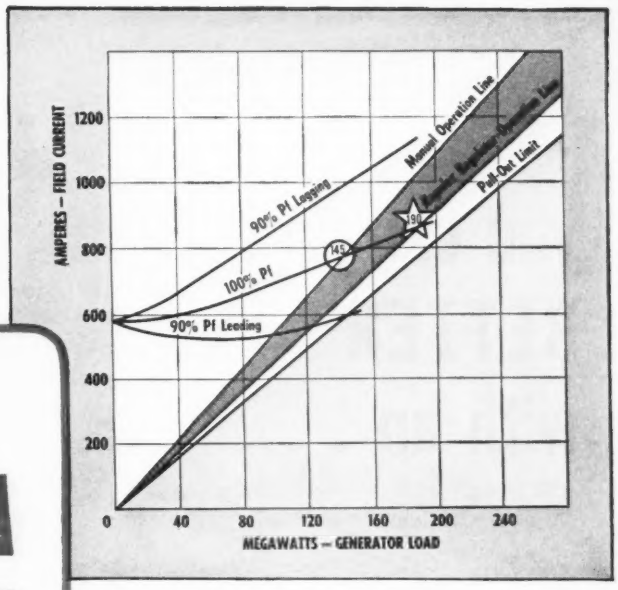
KNOX PORCELAIN CORP.

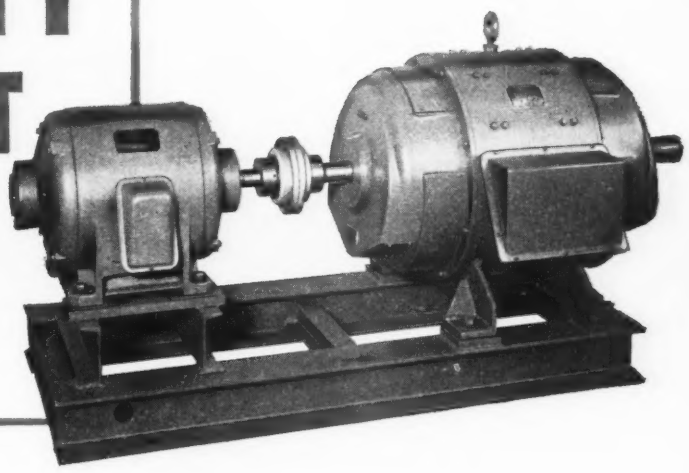
KNOXVILLE 1, TENNESSEE

ALLIS-CHALMERS
REGULEX
Voltage Regulator

AFFORDS MAXIMUM KILOWATT OUTPUT

. . . at ANY Power Factor Loading





Automatic minimum excitation provided by *Regulex* voltage regulator permits generator operation closer to the stability limit . . . much closer than manual operation permits. Thus, maximum generator pay load is assured at any power factor loading.

The Graph Tells The Story

By providing maximum stability, *Regulex* voltage regulation establishes and maintains a *safe* ratio between generator load and field current. In the graph, the gray area represents the increase in safe operating limit. The starred figure on the *Regulex* regulator operation line and the circled figure on the manual line afford a comparison of megawatt output. Note that regardless of the power factor loading, a much greater generator pay load is provided by *Regulex* regulator automatic minimum excitation.

Profit in increased kilowatt output . . . meet new demands on old generators . . . get maximum productivity out of new generator installation . . . with the *Regulex* voltage regulator. For complete information, call your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3924

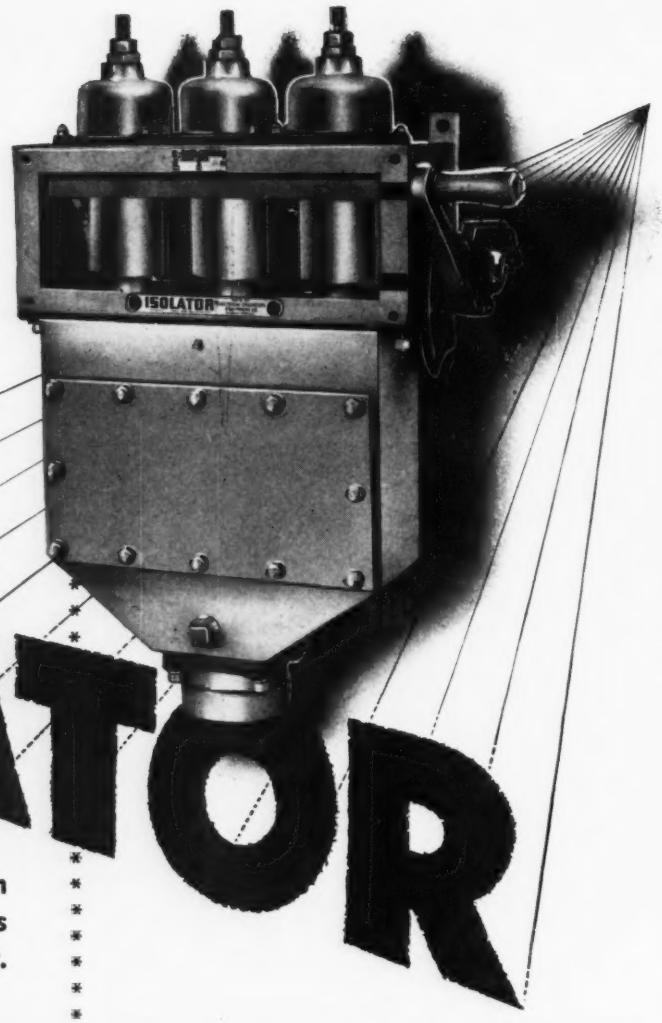
Regulex is an Allis-Chalmers trademark.

ALLIS-CHALMERS

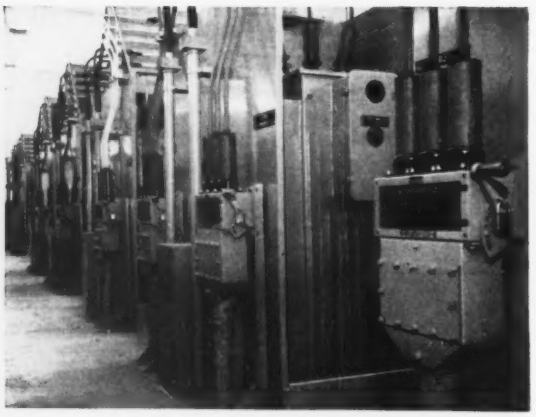
A-C ALLIS-CHALMERS

you can do it BETTER with an . . .

ISOLATOR



This is more than just a slogan. In hundreds of electric power installations it has proved itself as more efficient.



Pictured is an installation of CABLE ISOLATORS, one of "Three E" most efficient devices employing ISOLATOR design principles.

Here the Cleveland Electric Illuminating had to provide terminating and disconnecting means for twelve 4600 volt, three conductor cables at one of their strategically located substations. They did it the modern way by using CABLE ISOLATORS.

They {
- Protected live parts
- Saved space
- Saved material by doing the job with one compact double duty device.

"They did it better with an ISOLATOR"

Send for our bulletin 140 and see how you can use the ISOLATOR to good advantage.

ELECTRICAL ENGINEERS EQUIPMENT CO., THREE E **MELROSE PARK, ILLINOIS**

goes further ...

Not how many feet . . . but how many finished jobs per roll. That's the real test of a good tape.

Gold Seal Tape gives you guaranteed footage. But it also goes further because there's no waste. It tears evenly, does not ravel. A few wraps, and the job's finished . . . one thickness insulates. Get the most "coverage" for your money — specify Gold Seal.

Jenkins Bros. (Rubber Division),
100 Park Ave., New York 17.

JENKINS

Gold Seal Tape

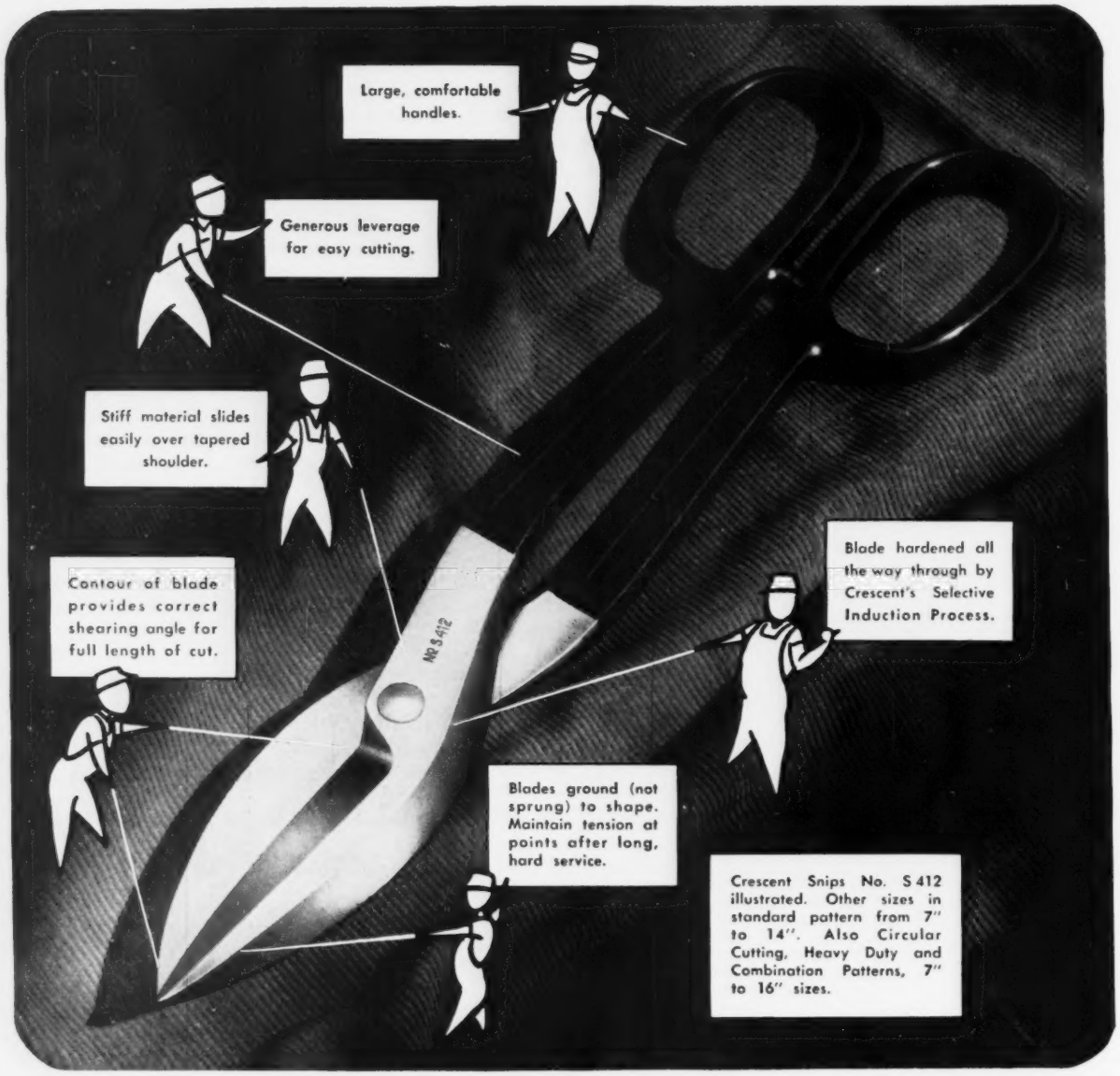
Jenkins Bros. also make
Diamond Seal Friction and Rubber Tapes
which meet ASTM Specifications.

FRICTION AND RUBBER TAPES
In 10-roll cartons or single rolls.
Every roll sealed in cellophane, stays fresh.

A PRODUCT OF JENKINS BROS. . . .

MAKERS OF FAMOUS JENKINS VALVES

Why Craftsmen prefer **CRESCENT SNIPS**


Large, comfortable handles.
Generous leverage for easy cutting.
Stiff material slides easily over tapered shoulder.
Contour of blade provides correct shearing angle for full length of cut.
Blade hardened all the way through by Crescent's Selective Induction Process.
Blades ground (not sprung) to shape. Maintain tension at points after long, hard service.
Crescent Snips No. S 412 illustrated. Other sizes in standard pattern from 7" to 14". Also Circular Cutting, Heavy Duty and Combination Patterns, 7" to 16" sizes.
No S 412

● All Crescent Snips are forged of selected steel and blades ground on special grinding machines. They are hardened by Crescent's own selective induction process to insure long satisfactory service. These easy-cutting, well-balanced snips are made in four patterns; standard, circular cutting, combination and heavy duty. Sold by hardware dealers everywhere.

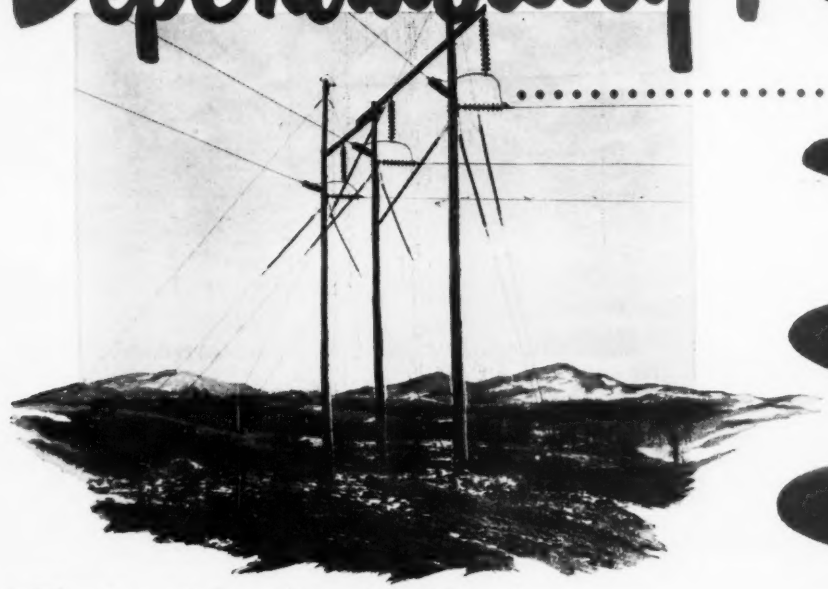
CRESCENT TOOLS
Give Wings to Work
®
Sign of the Artisan
Symbol of Excellence

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

For the Rugged hill country of West Virginia . . .

Rugged Dependability!

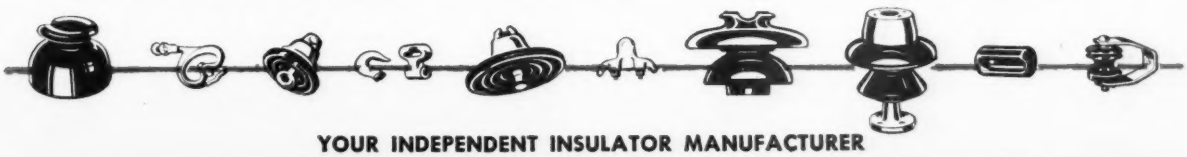


When the terrain is rough . . and weather tough . . a power transmission line must be *built to last.* Breakdowns must be avoided . . especially during the winter months when mile after mile of the line is virtually inaccessible.

Under conditions like these, expert "know-how" must be coupled with the finest equipment to assure positive dependability at all times . . and the line pictured here in the rugged hill country of West Virginia is an outstanding example of power transmission engineering.

Porcelain Products Suspension Insulators were chosen for this installation . . . a product of proven performance on thousands of miles of power lines.

A COMPLETE LINE OF TRANSMISSION AND DISTRIBUTION INSULATORS AND ACCESSORIES FOR ELECTRIC UTILITIES

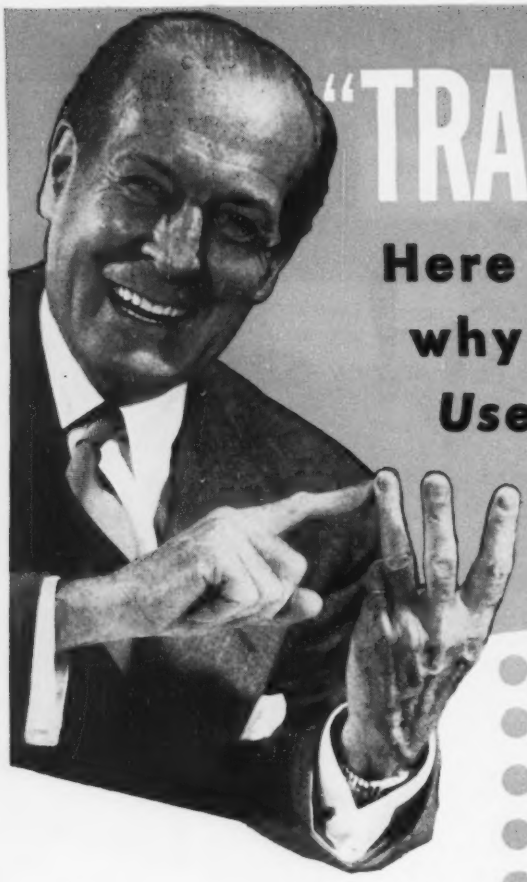


YOUR INDEPENDENT INSULATOR MANUFACTURER

Porcelain Products, Inc.

PARKERSBURG, W. VA.

Export Representative: Philips Export Corp., 100 E. 42nd St., New York 17, N.Y., U.S.A. Cable Address: "PHILYORK"



"TRANSFORMERS?

Here are Seven Reasons why we find it pays to Use Central!"

- Skilled, Conscientious Workmanship
- Tried-and-Proven Dependability
- Trouble-Free Performance
- Minimum Maintenance
- Long Life
- Reputation — Thousands in Use
- Prompt, Efficient Service

A Type for Every Need:

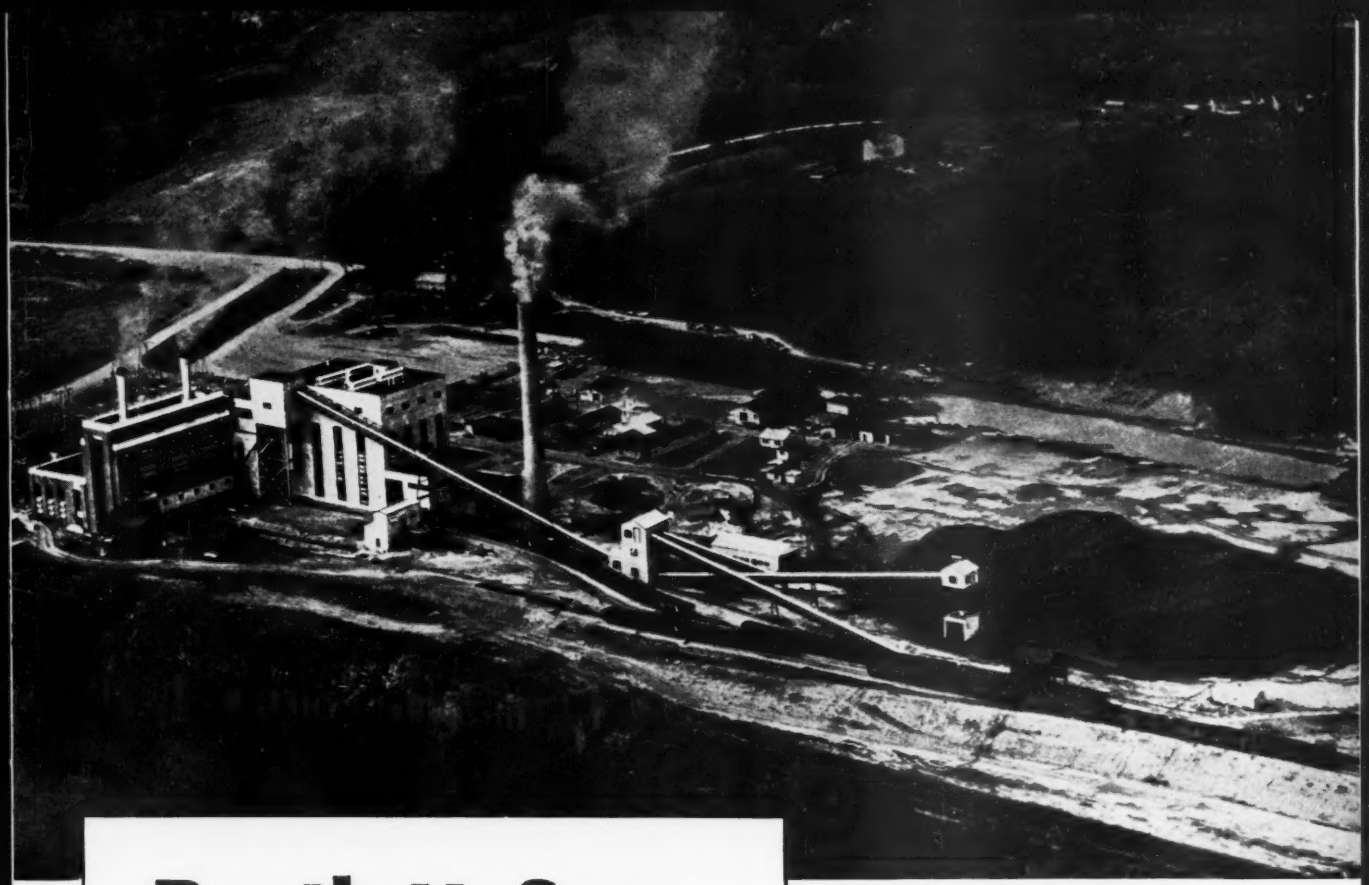
Transformers in sizes from 3 KVA to 10,000 KVA, up to 115 KV primary class.

Photo at right: Three 667 KVA Power Transformers. 69 KV Primary.

CTC Central TRANSFORMER CORP.

FORMERLY LARKIN LECTRO PRODUCTS CORPORATION

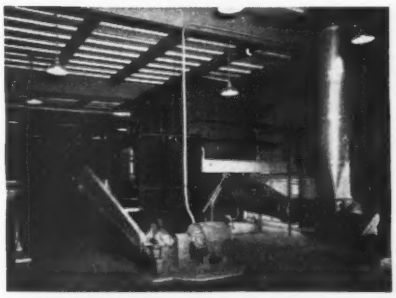
PINE BLUFF, ARKANSAS • Sales Offices in Principal Cities



Bartlett-Snow coal handling at *Bremo*

General View of Bremo Plant
Virginia Electric and Power Co.
Stone and Webster Engineering Corp.
Consulting Engineers

● The illustration above shows both the original building and the new addition of this 60,000 KW plant. All equipment including the track hopper, duplex feeder, 1326′ of belt conveyors, the 70′ dust tight flight distributor in the new addition, and the 111′ distributing belt and belt driven tripper in the original building were detailed and fabricated in our shops and installed by us to Stone and Webster's specifications. For maximum efficiency and fixed unit responsibility, let the Bartlett-Snow coal handling engineers, work with you on your next job.



View of Dust Tight Flight Conveyor
Distributing Coal to Bunkers (New Addition)

View of Belt and Belt Driven Tripper
Distributing Coal to Bunkers (Old Building)

DESIGNER ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

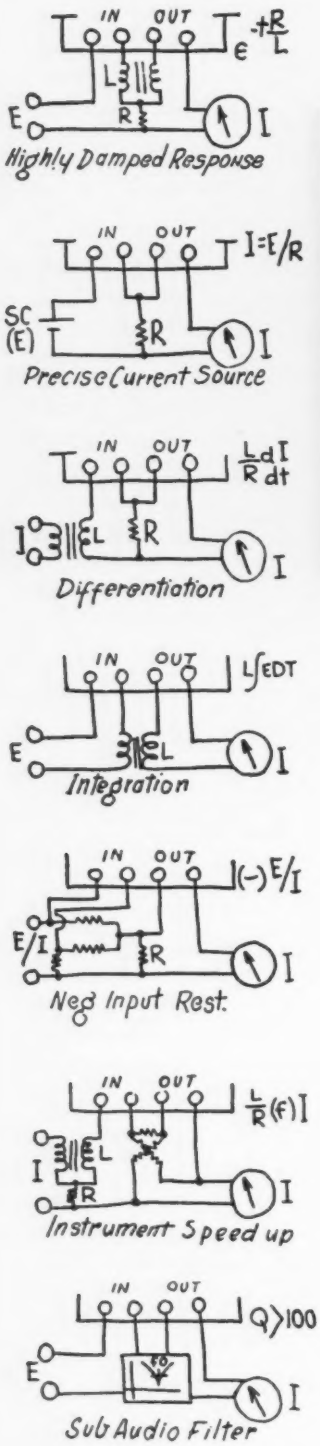
FABRICATORS ERECTORS

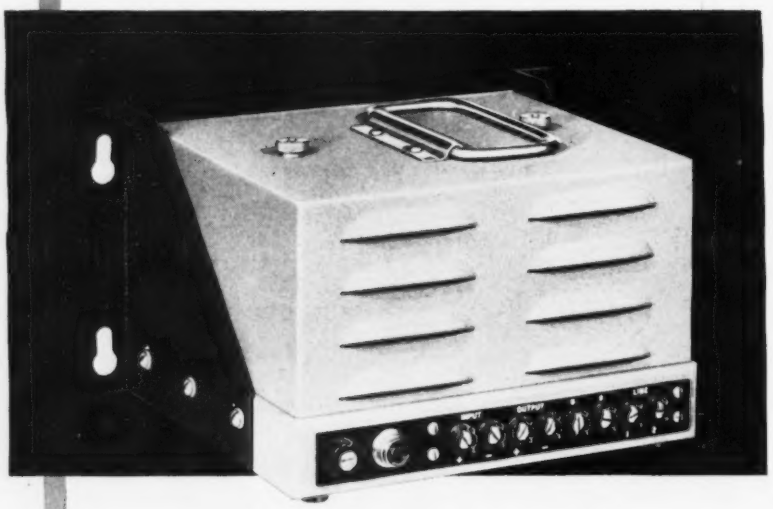
"Builders of Equipment for People You Know"

Weston Model 1411

D-C INSTRUMENT AMPLIFIER

SPECIAL APPLICATION SCHEMATICS





- A rugged, stable D-C Amplifier, with less drift.
- Has permanent components—no electrolytic capacitors, no choppers.
- Uses only tube types on standard Preferred list.
- High response speed (in the order of 1/10 sec. nominal—faster on the higher ranges).
- Accuracy better than 0.1% on higher ranges . . . 1% general accuracy.
- For industrial applications, ranges down to 1 millivolt and 20 microamperes—for laboratory service, ranges down to 100 microvolts and 2 microamperes.
- Interchangeable plug-in range standards.
- Descriptive bulletin on request.

WESTON ELECTRICAL INSTRUMENT CORPORATION
614 Frelinghuysen Avenue, Newark 5, New Jersey

WESTON
2237
Instruments

NEW BENJAMIN "PANEL-GLO"
cuts former Benjamin Price for ceiling louvers by as much as 50%!

NEW BENJAMIN "SKY-GLO"
Louvers now priced approximately 33⅓% less!

2 Great Advancements Insure Quality Lighting to Benjamin's High Standards at New Lower Prices!

New low prices and all-around simplification of Benjamin luminous ceiling lighting enable you to increase your ceiling lighting prospects by offering a lower installed price. Benjamin "Sky-Glo" and "Panel-Glo" represent a brand-new approach to ceiling lighting for stores, offices, etc. Here is lighting that is engineered for simple, low-cost installation . . . designed for high-level, well-diffused lighting quality, featuring the maximum seeing comfort always associated with Benjamin *translucent* ceiling lighting.
Send for Free "Sky-Glo" and "Panel-Glo" Data Bulletin.
Benjamin Electric Mfg. Co., Dept. K, Des Plaines, Illinois.

NEW Simplicity brings down installed price!
New, practical, easy-to-handle 3′ x 3′ translucent panels or louver sections.

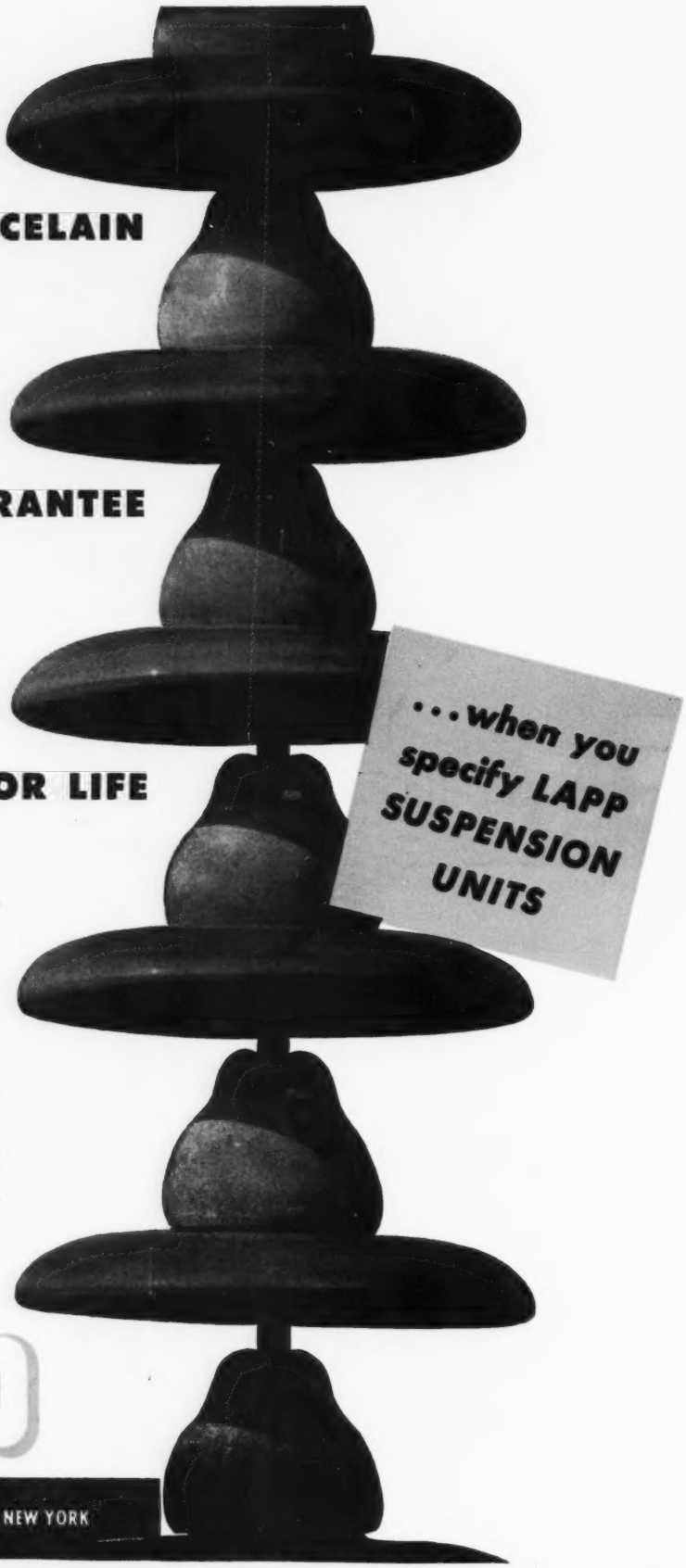
NEW, Easier installation brings down installed price!
No need to order "fill-in" size panels. Trim them yourself with scissors . . . right on the job . . . to the exact shape desired!
New metal FINISHING STRIPS neatly hide trimmed edges on either louver or luminous-panel jobs.

NEW, proven TRANSLUCENT plastic material means MORE LIGHT with CONTROLLED BRIGHTNESS.
(Same material used for "Sky-Glo" and "Panel-Glo.")

NOW, figure the complete price of a ceiling-lighting job by the sq. ft.!
Sq. ft. price includes all panels or louver sections as well as all the channels, fittings, etc. you need to complete the installation!*
No calculating, no figuring . . . just know the area of the room!
No layouts necessary for regularly-shaped rooms.
*lighting equipment not included.

BENJAMIN
Lighting Equipment
sold exclusively through electrical distributors

B-173



LAPP PORCELAIN

IS YOUR GUARANTEE

OF LONG INSULATOR LIFE

. . . when you specify LAPP SUSPENSION UNITS

Insulator life depends on soundness of porcelain, and assembly which gives it the best chance to live. For greatest insulator serviceability, look to the quality of the porcelain, and to assembly which recognizes the physical characteristics of the porcelain. Nowhere have these two requirements been the subject of more study, nor the object of more production care than at Lapp. The Lapp reputation for porcelain quality is ample basis for your confidence in the specification *"Lapp Suspension Insulators."*

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

sold exclusively through electrical distributors

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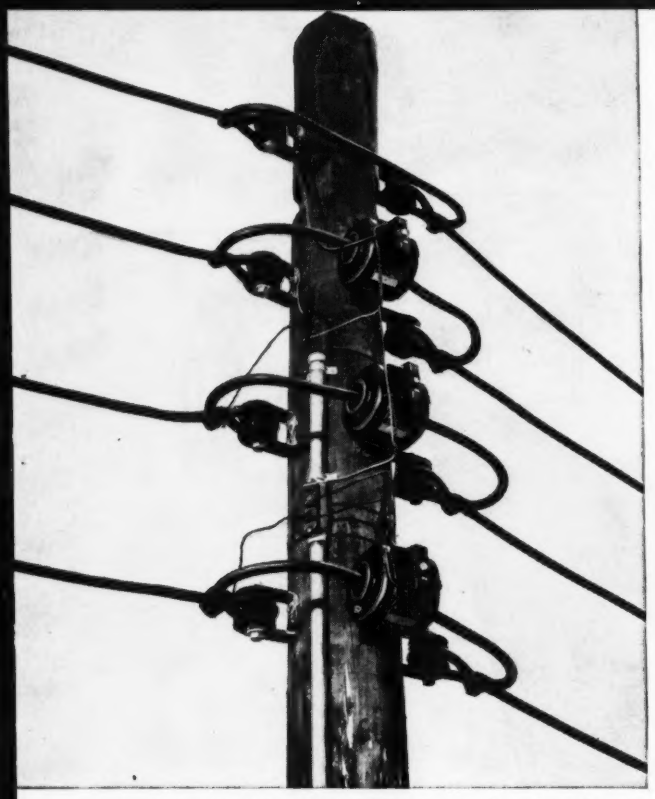


OUTDOOR INSTALLATIONS of JKP-0 are made without housing or cross-arms—due to low-cost, rugged butyl insulation-casing.

INDOOR VIEW shows insertion of two primary cables in two inch window. Secondary terminals on top permit close mounting.

New G-E Indoor-Outdoor Current Transformer Type JKP-0 Is Now Available from Stock

The new JKP-0 current transformer, with exclusive butyl-insulation and indoor-outdoor features, is available from stock.

4 WAYS THE JKP-0 SAVES

1. STOCKING COSTS REDUCED: Standardizing on the JKP-0 cuts costs by reducing stock requirements. This versatile new transformer replaces 5 G-E types.

2. MAINTENANCE IS REDUCED: JKP-0 transformers will not corrode and need no painting—due to rugged butyl-molded construction.

3. INSTALLATION COST IS LESS: The JKP-0 does not require elaborate arrangements of cross-arms, hanger, connections, etc.—and the amount of wiring is reduced.

4. INITIAL COST IS LESS: The JKP-0 sells for less than most of the conventional types it replaces.

FOUR RATINGS AVAILABLE

Four current ratings are available in the Type JKP-0. They are 200:5, 400:5, 600:5, and 800:5 amperes. These ratings are obtained by passing the line conductor once through the primary window. Additional ratings can be obtained by looping the primary conductor two or more times through the easily-accessible window.

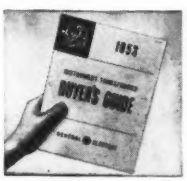
FOR MORE INFORMATION

Contact your local G-E representative today, or write for Bulletin GEA-5874 to Section 604-37, General Electric Company, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

1953 EDITION NOW AVAILABLE



FREE—SEND TODAY

General Electric Company, Sec. A 604-37
Schenectady 5, New York

Please rush my copy of the new 1953 INSTRUMENT TRANSFORMER BUYER'S GUIDE (GEA-4626).

( ) **Planning immediate project**

( ) **Reference**

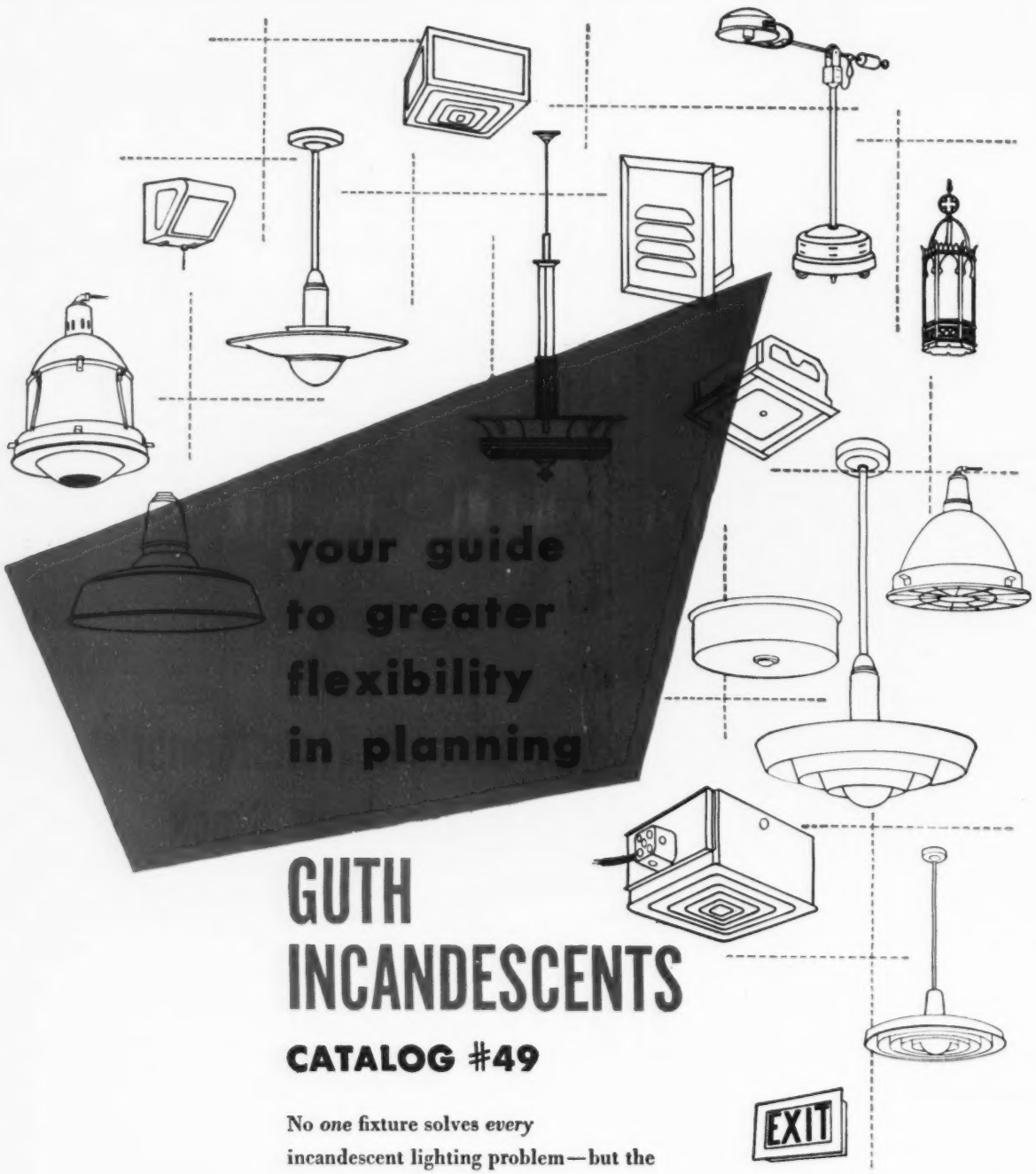
Name.....

Position.....

Company.....

Street.....

City..... **State**.....



GUTH INCANDESCENTS

CATALOG #49

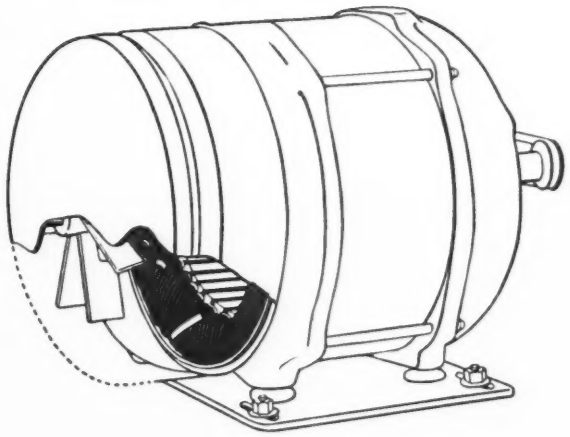
No *one* fixture solves *every* incandescent lighting problem—but the complete GUTH Line does!

May we send you a copy?

IT'S FREE!

LEADERS IN LIGHTING
Guth
SINCE 1902

THE EDWIN F. GUTH CO. / ST. LOUIS 3, MO.



T¢ lengths of BH Sleeving STOP $50 REJECT LOSS

A reject rate of three to seven motors a day was cutting the profits of a motor manufacturer. The varnished tubing insulation on the motor leads cracked when tapped into position. Taken off the assembly line — devarnished, reinsulated, reassembled and revarnished — each motor reject meant a $50 loss.

Then the manufacturer changed to BH "649" . . . a braided, Fiberglas, vinyl coated electrical insulation. It cost approximately 1c for each 2-inch length of BH "649" — and stopped the reject troubles!

More and more manufacturers are turning to BH Fiberglas Tubing and Sleeving for electrical insulation. It pays off by preventing insulation breakdowns, avoiding costly rejects. Its permanent flexibility prolongs product life.

Whether you're concerned with excessive current loads, vibration, extremes in temperatures, flexibility, fungus resistance, or what . . . let us help you. Send facts on your requirements, voltages and temperatures encountered. We'll make our recommendations and send you production testing samples.

Address Dept. W-3

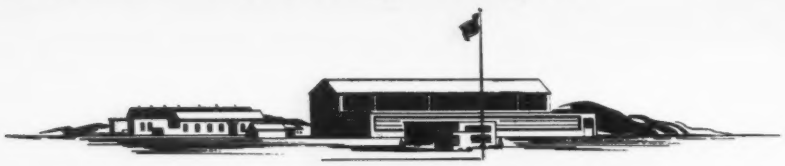
Bentley, Harris Manufacturing Co.
Conshohocken, Pa.

BH
1ST in use of Fiberglas
in heat-treated Fiberglas
in true high temperature flexibility
in vinyl-coated Fiberglas
in silicone rubber coating
in colors in silicone rubber
in true Class B (130°C.) protection

BH Fiberglas* SLEEVINGS

*BH Non-Fraying Fiberglas Sleevings are made by an exclusive Bentley, Harris process (U. S. Pat. No. 2393530). "Fiberglas" is Reg. TM of Owens-Corning Fiberglas Corp.

From B&W Research & Engineering . . .



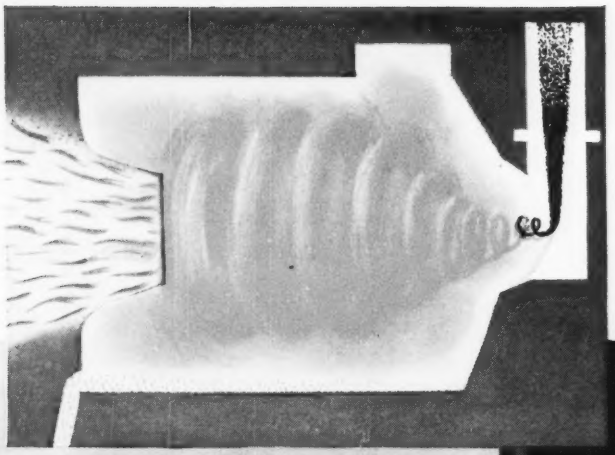
important advances in firing

Two important advances in firing—the Cyclone Furnace and Pressure Firing—used singly or in combination, are bringing major savings to central station and industrial boiler users. The reception and wide acceptance given both of these B&W developments result from proved efficiency and economy . . . amply demonstrated in the chart below.

The chart lists many possible ways in which the Cyclone Furnace and Pressure Firing contribute to better operation—often just one advantage means important economy. The revolutionary Cyclone Furnace and B&W's long-range experience with Pressure Firing are well worth serious consideration in your evaluation.

We will be pleased to discuss these and other practical developments of B&W Research and Engineering as they relate to your power generation program and facilities. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

	EFFICIENT	MAINTENANCE	AVAILABILITY	AUXILIARY POWER
CYCLONE FURNACE	• Efficient use of low-grade coals. • Extremely low carbon loss. • Low excess air.	• Practically no ID fan erosion. • Eliminates pulverizer maintenance. • Low maintenance on burner and coal preparation equipment. • Reduces cost of labor for ash and dust handling.	• Reduces slagging and cleaning of convection surfaces.	• Eliminates pulverizers. • Less soot blowing required.
PRESSURE FIRING	• Less stack loss . . . no air infiltration.	• Fewer controls to maintain. • No ID fan maintenance.	• Simplifies fan control.	• Less total fan power due to lower volume, weight, and draft loss handled by FD fan.



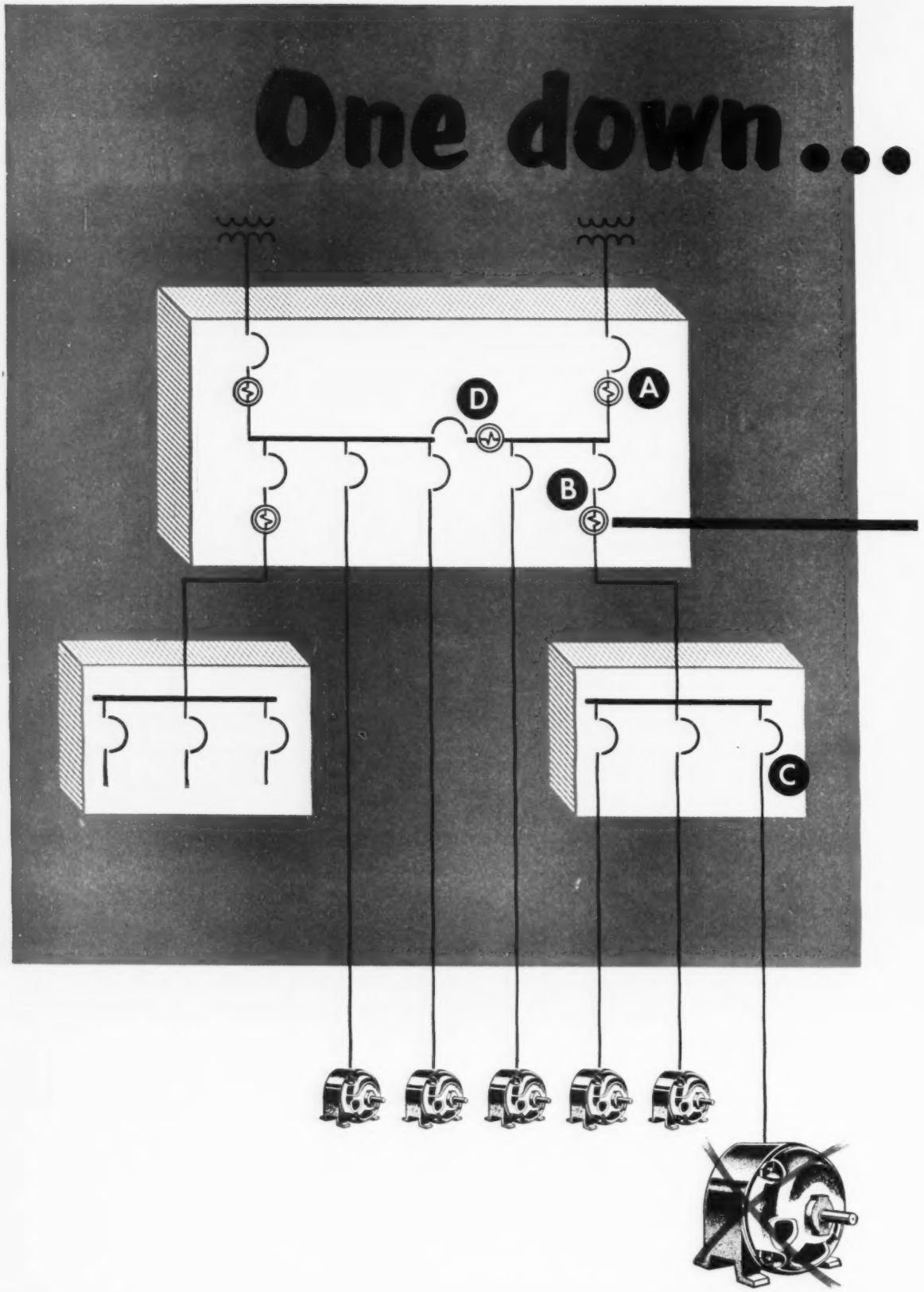
CYCLONE FURNACE

PRESSURE FIRING

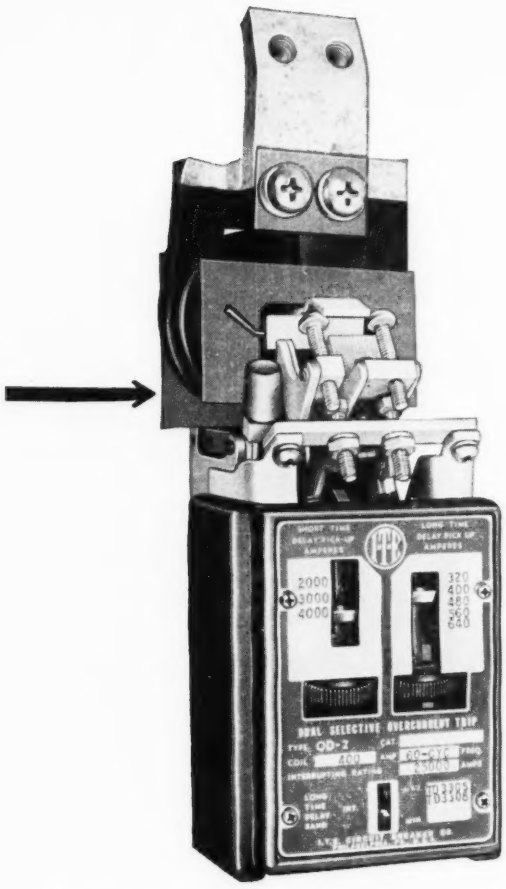
INITIAL COST	ACCEPTANCE
• Lower building and foundation costs. • Greatly reduced fly ash emission requires less dust handling equipment . . . smaller precipitators • Eliminates electrical connections and controls for PC motors • Smaller soot blower compressor.	B&W's revolutionary method of firing is being used for boilers having steam capacities as high as 1,200,000 lb per hr., pressures to 2250 psi, and temperatures to 1050 F. Burning coal, oil, and gas. Total generating capacity of all Cyclone Furnace Boilers in service and on order is over 2,000,000 KW. Accumulated service-time on all units is nearly a half century.
• Simplified design lowers duct and stack costs • ID fan can often be eliminated.	Broad acceptance of B&W's pressurized-furnace design is shown by the units in service and on order—by 27 electric utilities and some industrial plants—to serve a total generating capacity exceeding 8,500,000 KW. They include Radiant, Open Pass, Integral-Furnace and Stirling Boilers with individual steam capacities ranging between 200,000 and 1,370,000 lb per hr., design pressures to 2700 psi, and temperatures to 1100 F.

BABCOCK & WILCOX

G-596


One down...
A
B
C
D

or shutdown?



Selective tripping on I-T-E Circuit Breakers isolates system faults, boosts system reliability

What selective tripping is

Selective tripping is the economical means for providing reliable electrical service with complete freedom from general interruption. With selective tripping, several circuit breakers may be used in series; yet on overcurrent or fault, *only* the faulted circuit is interrupted.

What it does

Consider the following cases for a typical low-voltage system:

Without selective tripping—the overloaded motor in the diagram at left could cause breakers C, B, D, and A to trip, shutting down a boiler, a plant, or an entire system. This *will* happen, if the system does not include circuit breakers equipped for selective tripping.

With selective tripping—only breaker C will trip. A motor saved, one circuit interrupted, while *the rest of the system continues to operate—unaffected.*

I-T-E trip device is a compact circuit breaker component

Selective tripping in low-voltage systems is easily applied with I-T-E Circuit Breakers. The breakers are simply equipped with compact I-T-E *direct-acting dual-selective overcurrent trip devices.* No expensive current transformers, no relays, no added switchboard panels are required. The trip devices are fitted as an integral part of the breaker.

Consider I-T-E selective tripping for your system

In central stations, in manufacturing plants, in the processing industries—I-T-E selective tripping has saved in initial investment, boosted system reliability, and reduced breaker maintenance. If you're planning a new low-voltage switchboard application, investigate the advantages of direct-acting I-T-E trip devices.

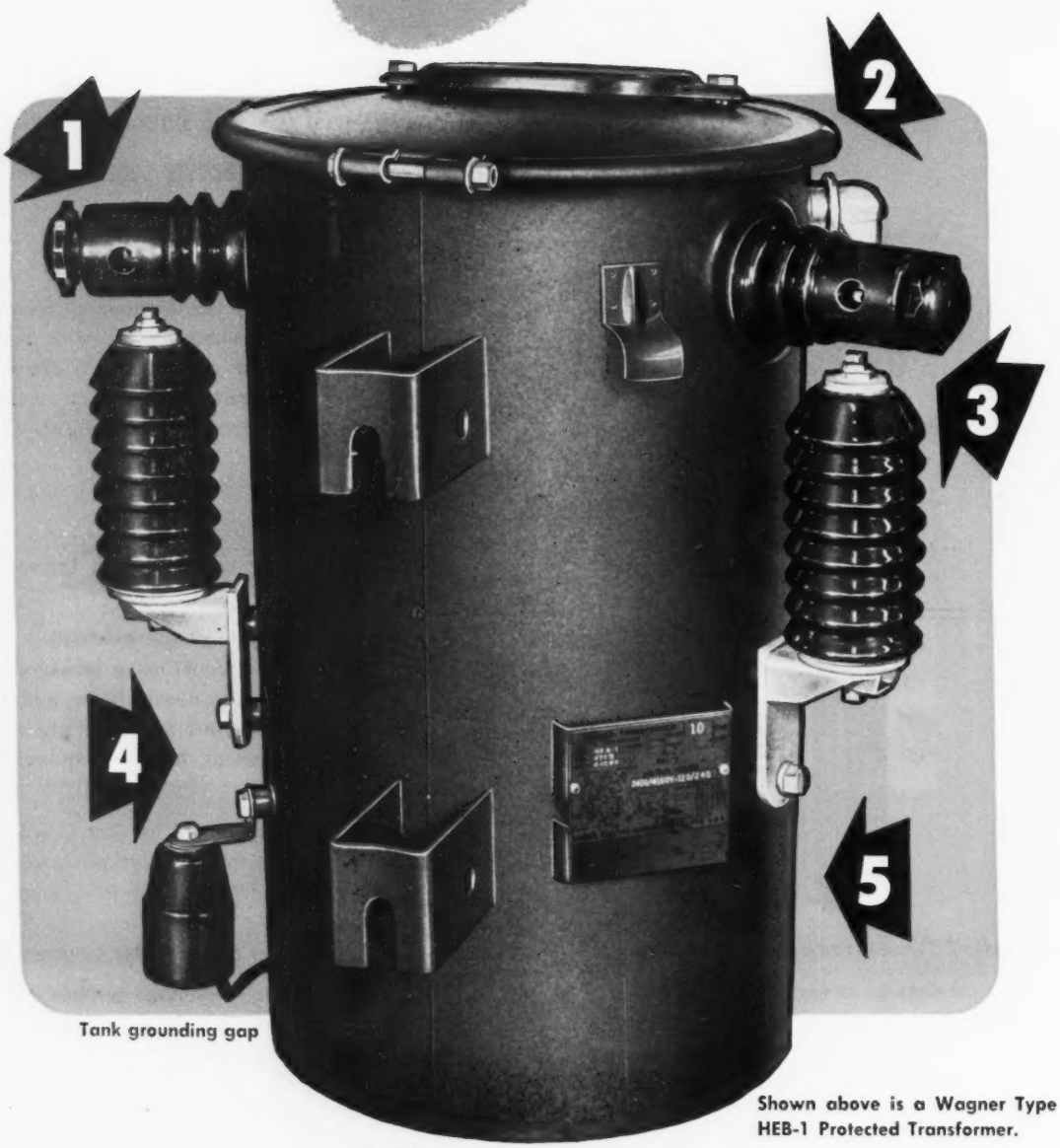
I-T-E

LOW-VOLTAGE SWITCHGEAR

I-T-E CIRCUIT BREAKER CO. • 19TH AND HAMILTON STS. • PHILADELPHIA 30, PA.

CANADIAN MFG. & SALES: EASTERN POWER DEVICES, LTD., TORONTO

these 5 important



Shown above is a Wagner Type HEB-1 Protected Transformer.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T53-2

advantages are yours

with Wagner Form W

Distribution Transformers

1 HIGH VOLTAGE SIDEWALL BUSHING

This high voltage bushing gives you *faster, easier, safer* permanent connections. Conductor is just pushed into the connector—no special tools are needed—and connector is tightened with a few turns of the insulated finger-grip knob.

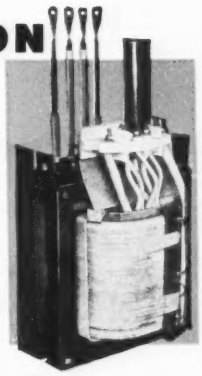
2 SHUR-SEAL COVER

You get true sealed-tank construction with covers sealed to the tank with the Wagner SHUR-SEAL Clamping Ring. "Breathing" is completely prevented—no oil can be lost during shipment or handling.

3 PRE-SET LINE TO ARRESTER ISOLATING GAP

You can get a bushing and arrester assembly that occupies minimum tank space and gives easier, safer, permanent transformer connections with arresters isolated from the line.

4 FORM W CONSTRUCTION



You get the advantage of preformed cores of cold rolled, oriented grain steel that permits a liberal design in small size, lightweight transformers that give excellent electrical performance. Form W Transformers pay dividends in longer service life.

5 INHIBITED OIL

You get extra years of service-free transformer life because Wagner distribution transformers are filled with an inhibited oil to reduce oxidation to a minimum and retard the formation of acids and sludge.

* * *

When you choose Wagner Transformers—you get all these important advantages. And in addition—Wagner has a nationwide organization to provide fast, convenient service, with branches in 32 principal cities. Bulletin TU-180 gives complete information on Wagner Distribution Transformers.

All Wagner Distribution Transformers are Standardized to meet your requirements

This means that you get the benefit of the improved design, quality contruction and high efficiency of Wagner Transformers with *standardized* mechanical features in ratings of 500 kva and below.

Here is the rugged FWD Light Duty LD, that's a great "go anywhere" unit for many general maintenance assignments.

Here's a single source for more than 78 "Mobilized Tools"

FWD offers you an exactly matched combination of truck – cab – winch, derrick or boring machine – and platform or line body

Whether it's for line construction or maintenance, there's an FWD "Mobilized Tool" to meet your exact requirements. And your FWD dealer is prepared to offer you excellent service and supply on the complete unit.

When you buy FWD, you simplify purchasing, pinpoint responsibility. And, you're assured the service source that can competently service the complete "Mobilized Tool."

These installations illustrate only a few of the more than 78 matched combinations you can choose from. Ask your FWD dealer to give you all the facts . . . show you why an FWD is your best buy. He'll be pleased to help you select the right "Mobilized Tool" for your particular work.

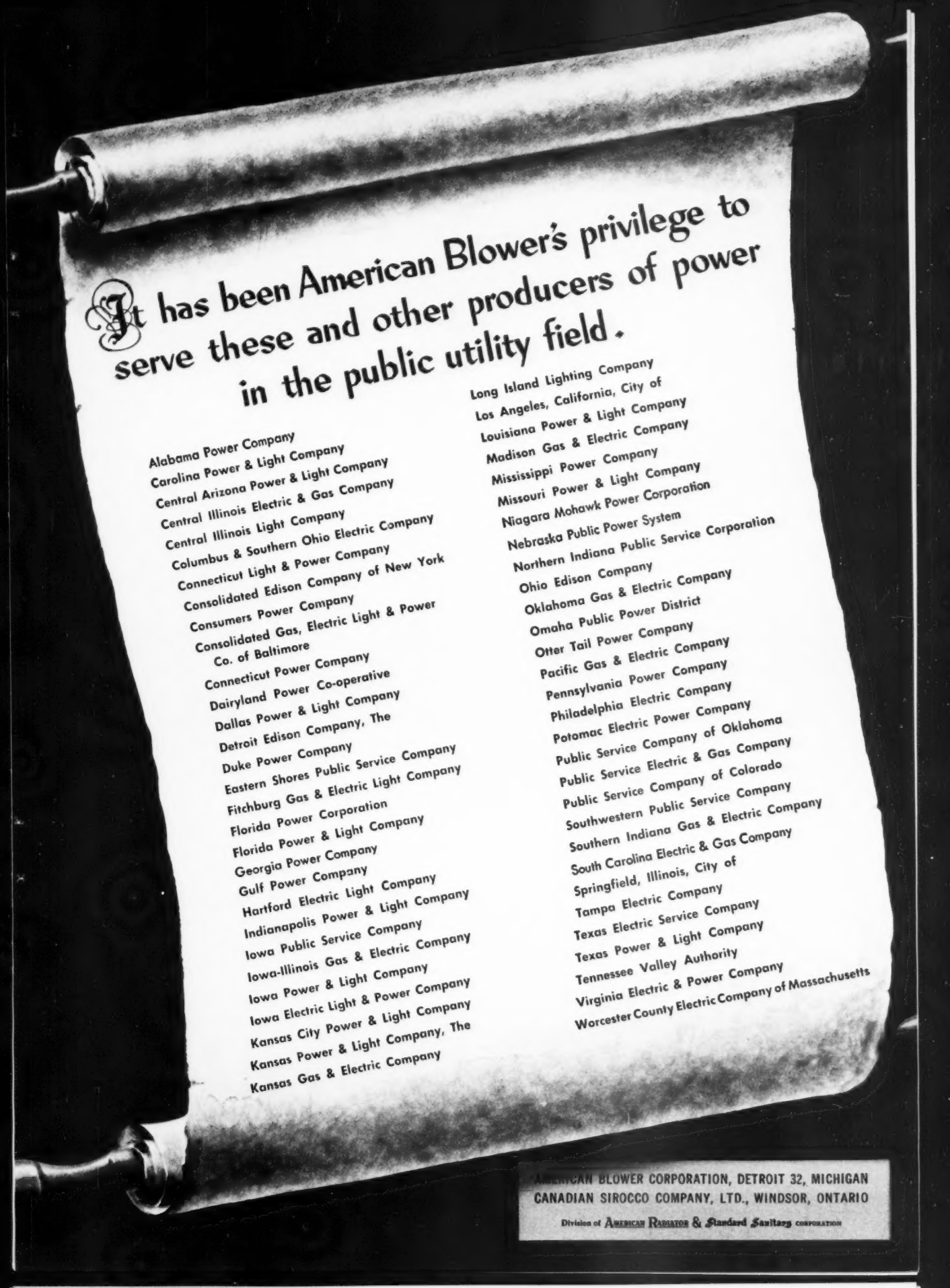
THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wis • *Canadian Factory*: Kitchener, Ont.

This sturdy FWD model HAU not only bores holes with the auger, but uses its integral derrick to set the pole.

This cab-over-engine FWD operates in really rugged country, frequently in extremely bad weather. Carries a crew of five . . . can be equipped for either maintenance or construction work.

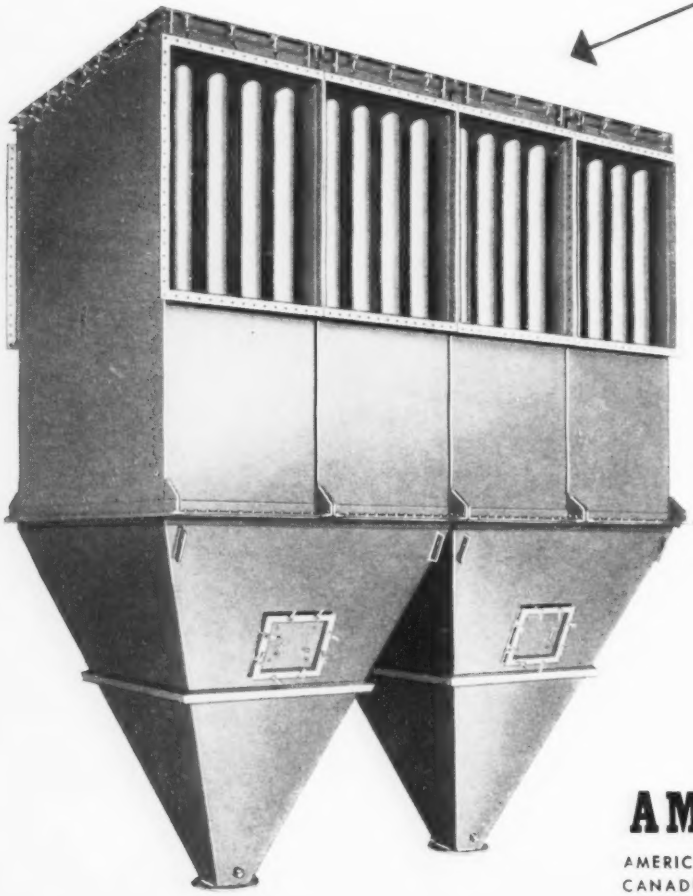
Equipped with ¾ line body, auger and tripod derrick, this FWD speeds line construction along the highway or cross-country.

Built by the makers of America's Foremost Heavy-Duty Trucks


It has been American Blower's privilege to serve these and other producers of power in the public utility field.
Alabama Power Company
Carolina Power & Light Company
Central Arizona Power & Light Company
Central Illinois Electric & Gas Company
Central Illinois Light Company
Columbus & Southern Ohio Electric Company
Connecticut Light & Power Company
Consolidated Edison Company of New York
Consumers Power Company
Consolidated Gas, Electric Light & Power Co. of Baltimore
Connecticut Power Company
Dairyland Power Co-operative
Dallas Power & Light Company
Detroit Edison Company, The
Duke Power Company
Eastern Shores Public Service Company
Fitchburg Gas & Electric Light Company
Florida Power Corporation
Florida Power & Light Company
Georgia Power Company
Gulf Power Company
Hartford Electric Light Company
Indianapolis Power & Light Company
Iowa Public Service Company
Iowa-Illinois Gas & Electric Company
Iowa Power & Light Company
Iowa Electric Light & Power Company
Kansas City Power & Light Company
Kansas Power & Light Company, The
Kansas Gas & Electric Company
Long Island Lighting Company
Los Angeles, California, City of
Louisiana Power & Light Company
Madison Gas & Electric Company
Mississippi Power Company
Missouri Power & Light Company
Niagara Mohawk Power Corporation
Nebraska Public Power System
Northern Indiana Public Service Corporation
Ohio Edison Company
Oklahoma Gas & Electric Company
Omaha Public Power District
Otter Tail Power Company
Pacific Gas & Electric Company
Pennsylvania Power Company
Philadelphia Electric Company
Potomac Electric Power Company
Public Service Company of Oklahoma
Public Service Electric & Gas Company
Public Service Company of Colorado
Southwestern Public Service Company
Southern Indiana Gas & Electric Company
South Carolina Electric & Gas Company
Springfield, Illinois, City of
Tampa Electric Company
Texas Electric Service Company
Texas Power & Light Company
Tennessee Valley Authority
Virginia Electric & Power Company
Worcester County Electric Company of Massachusetts
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary corporation

American Blower . . . a time-honored name in air handling

This filter
collects the sludge
from the oil in your car



This American Blower
Fly Ash Precipitator
collects fly ash from boilers
in power plants burning
solid fuels.

In both instances,
objectionable material
is collected in a
proved, practical manner.
Investigate American Blower
Fly Ash Precipitators NOW!

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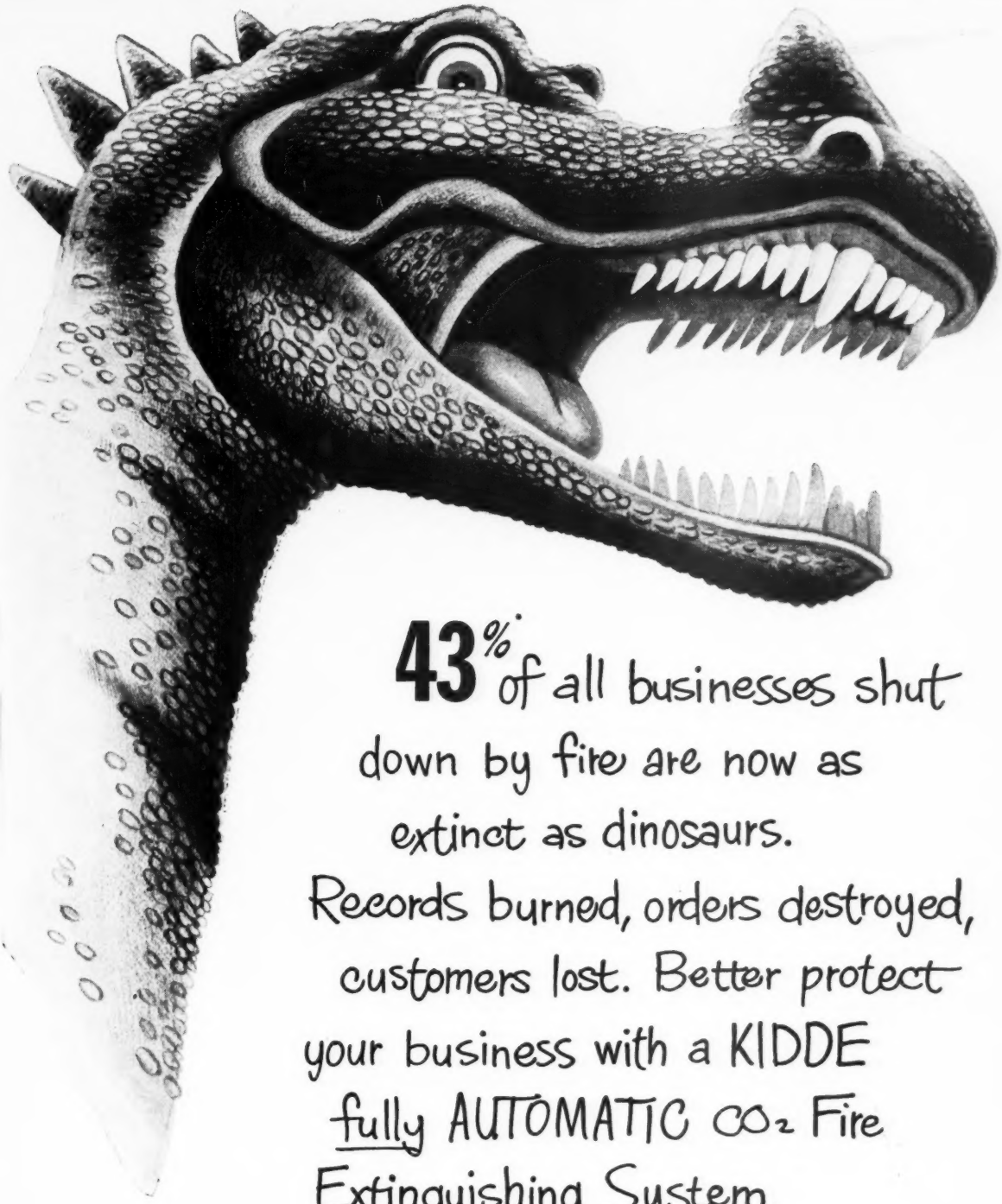
Serving home and industry

AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS & WALL TILE · DETROIT CONTROLS · KEWANEE BOILERS · ROSS EXCHANGERS



43% of all businesses shut down by fire are now as extinct as dinosaurs. Records burned, orders destroyed, customers lost. Better protect your business with a KIDDE fully AUTOMATIC CO_2 Fire Extinguishing System.

Kidde

Walter Kidde & Company, Inc.
330 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

*according to a survey by the Safe Manufacturers' National Association

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc. and its associated companies.

Holan's modern Cleveland plant is the largest single production unit in the country devoted exclusively to making mobile equipment for utilities. It encompasses more than 125,000 square feet under one roof and is situated on an 18-acre tract plotted for future expansion.

HOLAN

Research, Engineering and Manufacture of Mobile Equipment for Utilities Centers in This Modern Plant

Forgive us for pointing, but let's review some reasons why the plant shown above produces the highest ratio of quality-per-dollar value in mobile equipment for utilities . . .

Holan research and engineering are geared directly, and exclusively, to the requirements of utilities construction, maintenance and repair. They are responsible for many firsts resulting in improved conditions, lowered costs, in field work.

Holan's research, plus production skill and facilities, are available at all times for collaboration with utilities staffs on further improvements or new developments in this field.

J. H. HOLAN CORPORATION

BODIES AND ACCESSORIES FOR UTILITIES
4100 West 150th Street — Cleveland 11, Ohio

DISTRICT SALES REPRESENTATIVES

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BAKER EQUIPMENT ENGINEERING CO.
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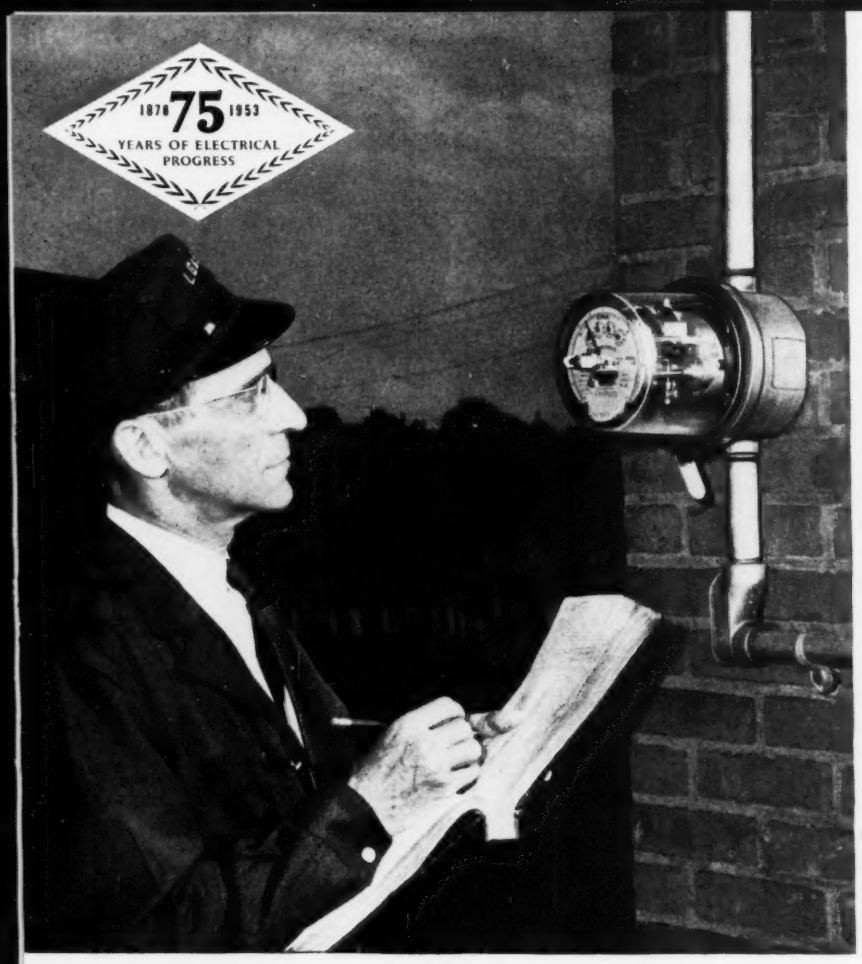
2401 Hutchinson Ave., Charlotte, N. C.
Shop Road, Columbia, S. C.

SCHETKY EQUIPMENT CORP.
1810 S. E. 10th Ave., Portland 14, Ore.



IM-50 Meters Give Accurate, Low-Cost Demand Measurement

Moderate price and low installation cost make the General Electric IM-50 watthour demand meter the type best suited for measuring demand of small industrial and commercial power users.

The watthour meter is the well-known Type I-50, having such benefits as magnetic suspension (no meter-bearing wear), lightning protection, and sustained calibration—which combine to give accurate and reliable performance with little maintenance. The demand register is a mechanical block-interval type—either indicating (M-30) or cumulative (M-31).

QUICK, EASY RESETTING—The reset mechanism is simple and readily resealed, requires only one hole in the glass cover, and is corrosion-resistant to prevent sticking with rust.

Interval resetting is positive and precise, with no impact upon returning to zero. This minimizes wear and the possible necessity for occasional readjustment.

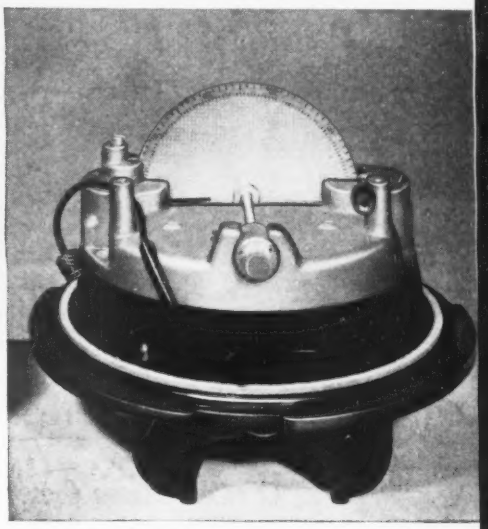
ADJUSTMENTS MINIMIZED—The register has few adjustments, all accessible and easy to make. Freedom from wear, together with high factors of safety, reduces any subsequent readjustment to the minimum.

For more information, contact your G-E representative or write Section 601-93, General Electric, Schenectady 5, N. Y.

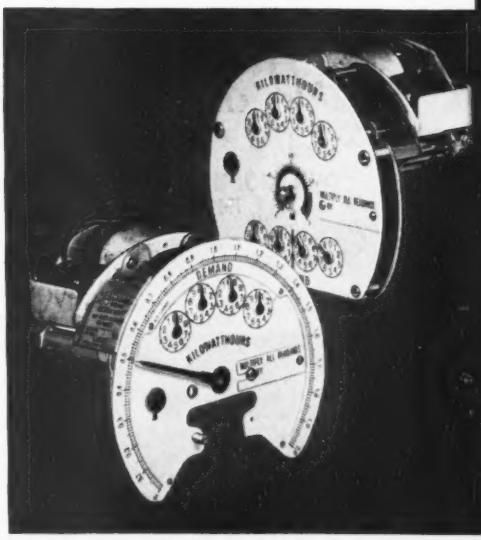
You can put your confidence in—

GENERAL ELECTRIC

IM-50 METERS are available for socket (left) or front (above) connections, with variations up to 10% of rated meter voltage permissible.



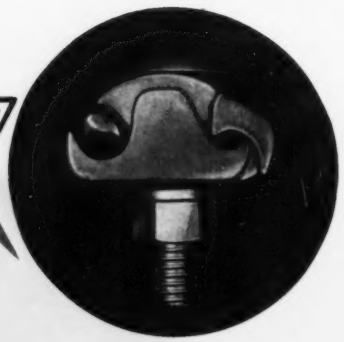
I-50 FEATURES such as magnetic suspension, die-cast frame, and molded insulation provide sustained accuracy and reliable performance.



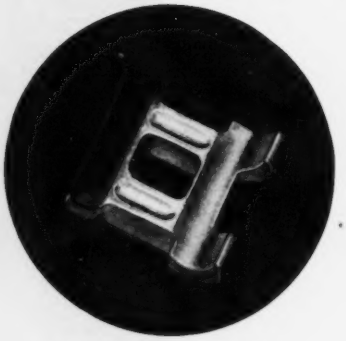
INDICATING OR CUMULATIVE REGISTER is used. Either can be purchased separately for use on watthour meters that are now in service.

THERE IS NO SUBSTITUTE FOR MORE THAN

25 Years Experience



When Making Copper to Aluminum Connections Use Cast Aluminum Connectors with Copper Liners



For Continuity of Service be sure, by test, copper liners are properly bonded to aluminum clamping members.

Copper Liners Securely bonded to aluminum clamping members by an exclusive process which prevents voids in bond. Years of satisfactory connections certify the use of these connectors.

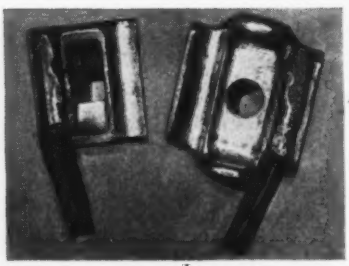
Be Sure—Buy Aluminum Connectors, Clamps, fittings and accessories backed with more than 25 years of electrical, mechanical and metallurgical knowledge and manufacturing experience gained in meeting and maintaining the most exacting standards of the electrical industry.

Cast Aluminum Connector of other manufacture

•

TEST

Copper Liners Easily Peeled Loose from Aluminum Clamping Members



Examination Discloses:

Poor bond with voids allowing moisture and atmospheric contamination to enter between aluminum clamping member and copper liner causing electrolytic action and connector failure.

OUR PRODUCTS ARE QUALITY CONTROLLED FROM INGOT TO FINISHED PRODUCT

Consult one of our nearest eighteen representatives or contact our main office

Aluminum and Bronze
POWER CONNECTORS
•
CLAMPS
•
FITTINGS and ACCESSORIES
for
SUBSTATION — TRANSMISSION — DISTRIBUTION

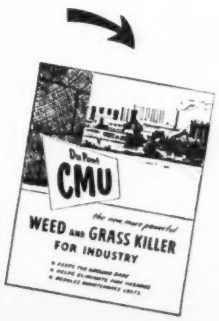
ANDERSON BRASS WORKS
INCORPORATED
BIRMINGHAM 1, POST OFFICE DRAWER 2181 ALABAMA

Powerful Du Pont CMU kills weeds and grass and prevents regrowth

Save labor and simplify weed and grass control with Du Pont CMU. As little as 1 to 1½ pounds per 1000 square feet . . . 40 to 60 pounds per acre . . . can get rid of weeds and grass for an entire growing season or longer. It gives you new efficiency in cutting down maintenance and fire problems caused by unwanted vegetation. Use CMU around power plants, substations, pole yards, signs and parking areas.

- Kills most kinds of weeds and grass and prevents regrowth. It works through the roots . . . just spray it on the ground.
- Eliminates fire hazards caused by unwanted vegetation.
- Saves work. One easily applied spray takes the place of laborious hand cutting, mowing, spreading of bulky chemicals or use of repeated weed sprays.
- Cuts maintenance and depreciation costs. Prevents weeds from fouling up equipment, keeps the way clear for outdoor work of any kind. Destroys cover for rodents and other vermin.
- Non-flammable, non-volatile, non-corrosive. Comes as a wettable powder to mix with water.

TO GET THIS BOOKLET SHOWING RESULTS WITH CMU, *fill in coupon at right.*



DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.) C-3
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MIDWEST

The Only Change is in the Name

MIDWEST PIPING & SUPPLY CO., INC.
has Changed its Name to

Midwest Piping Company, Inc.

6283

Because the word "Supply" is no longer accurately descriptive of the major business operations of this company, the stockholders have voted to drop it from the corporate name.

There has been no change in management, ownership or business at Midwest . . . and none is contemplated. Only the name has been changed. Midwest continues all its activities in the fabrication and installation of piping, and in the manufacture of welding fittings.

MIDWEST PIPING COMPANY, INC.

Executive Offices: 1450 South Second St., St. Louis 4, Mo.

Plants: ST. LOUIS, PASSAIC, LOS ANGELES and BOSTON

Sales Offices: NEW YORK 7—50 CHURCH ST. • TULSA 3—224 WRIGHT BLDG.
CHICAGO 3—79 WEST MONROE ST. • LOS ANGELES 33—520 ANDERSON ST.
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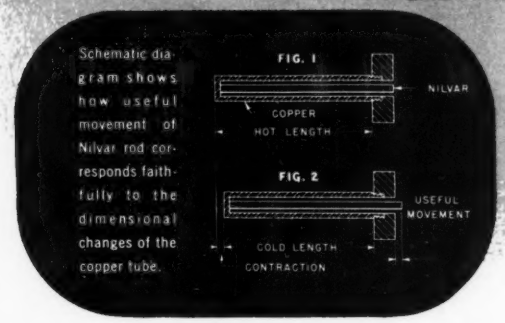
PIPING FABRICATORS AND CONTRACTORS FOR MORE THAN 50 YEARS
MANUFACTURERS OF WELDING FITTINGS FOR MORE THAN 20 YEARS

The Dimensional Stability of NILVAR* Spells Perfect Product Performance

Robertshaw-Grayson "Unitrol" fully automatic temperature control for gas water heaters



Schematic diagram shows how useful movement of Nilvar rod corresponds faithfully to the dimensional changes of the copper tube.

How Robertshaw-Fulton built a better Water Heater Control with Driver-Harris NILVAR

The new "Unitrol" Robertshaw-Grayson gas water heater control streamlines three essential controls into one valve body: a snap action thermostat, a snap action pilot, and a large-capacity gas cock. This reduces inventory for the water heater manufacturer and simplifies part stocking for the dealer.

The "Unitrol" provides a thermostat capable of delivering maximum amount of useful movement, by employing a copper tube enclosing a Nilvar alloy rod. The tube expands and contracts very appreciably in response to immersion temperatures. But the Nilvar rod, because it is dimensionally stable, does not vary in length. Since the free end of the Nilvar rod actuates the working gas valve, the slightest movement of the temperature-sensitive copper tube is fully utilized to control flow of gas to the burner.

Says Robertshaw-Fulton: "The outstanding dimensional stability of Nilvar actually permits minute changes in water temperature to regulate the heat supplied by the burner, thus assuring extremely accurate operation."

Nilvar has a temperature coefficient of expansion as low as .000001 per degree C., lowest of any alloy; comparable to that of quartz. Somewhere in your engineering operations such extraordinary dimensional stability may solve a problem—help to perfect product performance. We shall be glad to make recommendations based on your particular needs.

*T.M. Reg. U.S. Pat. Off.

Nilvar is produced only by

Driver-Harris Company

HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

In Canada: The B. GREENING WIRE COMPANY, Ltd., Hamilton, Ontario.

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

OKONITE'S 75TH ANNIVERSARY

Here's what
PROOF OF DEPENDABILITY

The real proof of dependability is in service records, for no claim or specification can be better judged than by the passage of time. The best example of Okonite's dependability is that Okonite cable, which was already in use before the electric light was invented, is in increasing demand today

LONG SERVICE LIFE. An Okonite cable, after 36 years of service in the old Hotel Gibson, was reinstalled in the new hotel erected on the site.

Here's what
PROOF OF VERSATILITY

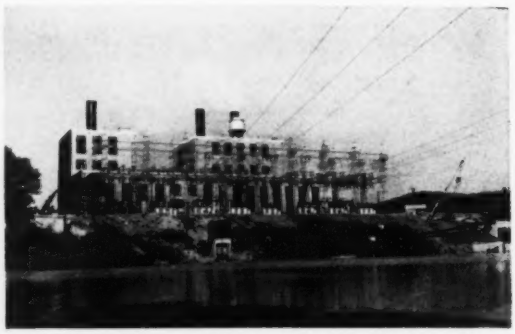
Small low voltage cables or large high voltage transmission systems are all within the scope of Okonite manufacturing experience. Whether underwater, underground or aerial, Okonite has developed wires and cables that operate continually under the severest tests that such installations can impose.

UNDERGROUND. Okolite-Okoprene underground cables are designed to be buried directly in the ground.

Here's what
PROOF OF CUSTOMER SATISFACTION

Wherever electricity is transmitted, whether in large blocks of power or for sensitive low voltage control, Okonite has been specified in orders and re-orders. The wide-spread use of Okonite wires and cables is proof of Okonite's acceptance as a leader in the field.

Utilities, railroads and industry recognize the fact that there is no substitute for experience . . . and that the Okonite symbol is the guarantee of quality. The Okonite Company, Passaic, New Jersey.

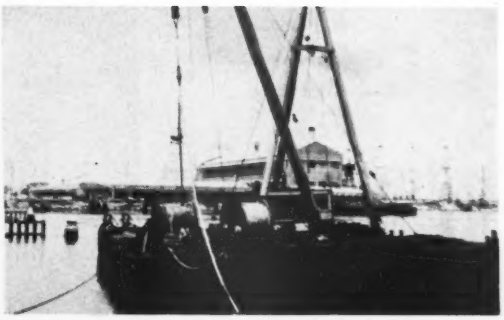


UTILITIES. Utility companies use Okonite cables for such varied purposes as control cable, transformer and generator leads, and transmission lines.

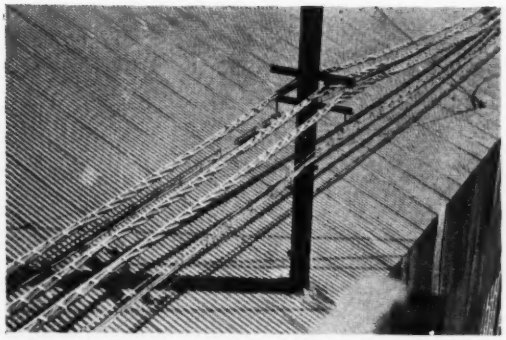
OKONITE OKONITE SINCE 1878 ***insulated cables . .***

means... what?

REPEAT PERFORMANCE. This first motor-operated electric semaphore signal was powered through Okonite—as is today's modern counterpart on the same site.

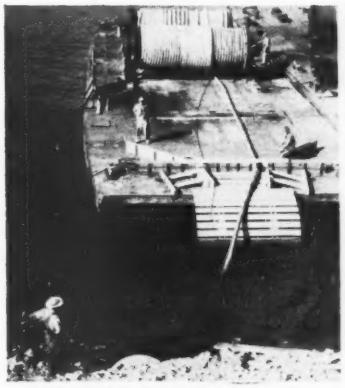


MULTIPLE INSTALLATIONS. Installed in 1941, these 34.5 kv Okolite submarine cables supplement an existing pair of 34.5 kv cables installed in 1931.

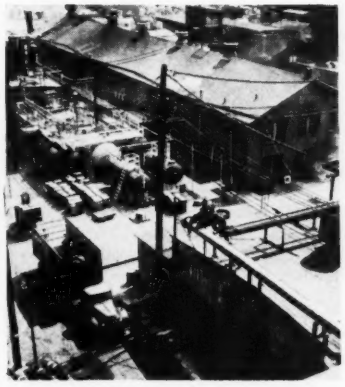


AERIAL. Okolite-Okoprene self-supporting cables can be installed quickly, easily and economically.

UNDERWATER. Okolite insulation requires no lead sheath even when totally submerged.



INDUSTRY. From power distribution to production machinery, Okonite cables play an important part in industry.



TRANSPORTATION. Classification yards, powerful diesels, signal systems, and passenger cars depend on Okonite cables for uninterrupted service.

• ***products of on-the-job experience***

to make wood *LAST*

treat it with PENTA

Long Life *is assured for the 20,000 board feet of laminated fir in this substation built by the Municipal Electric Company, Kirkwood, Mo. Builder had all wood pressure-treated to 6# net retention with penta-in-oil solution, increasing by many times the normal life of the structure.*

in substations, for example . . .

Exposed wood in any structure is subject to attack by rot and insects from the date of construction.

One simple requirement in the specs — *pressure-treat it with penta*—will extend the service life of wood members many times the normal span.

Technical Data on penta and its many applications are contained in this book, titled "Specify Penta." For your copy, write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 800 North Twelfth Blvd., St. Louis 1, Missouri.

3 REASONS FOR PRESSURE-TREATING WOOD WITH MONSANTO PENTA:

1 **Clean Treatment.** Proper treatment with penta will leave surfaces clean and nonbleeding—paintable, if specified.

2 **Double Protection.** Penta treatment prevents both decay and insect attack for years, thereby reducing maintenance problems and costs.

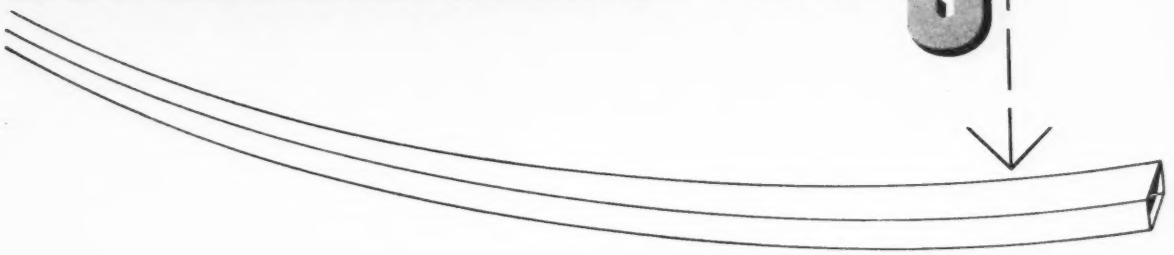
3 **Lasting Protection.** Monsanto Penta, forced deep into the cells of wood, stays there. Rain or ground water will not wash it out.

PENTA

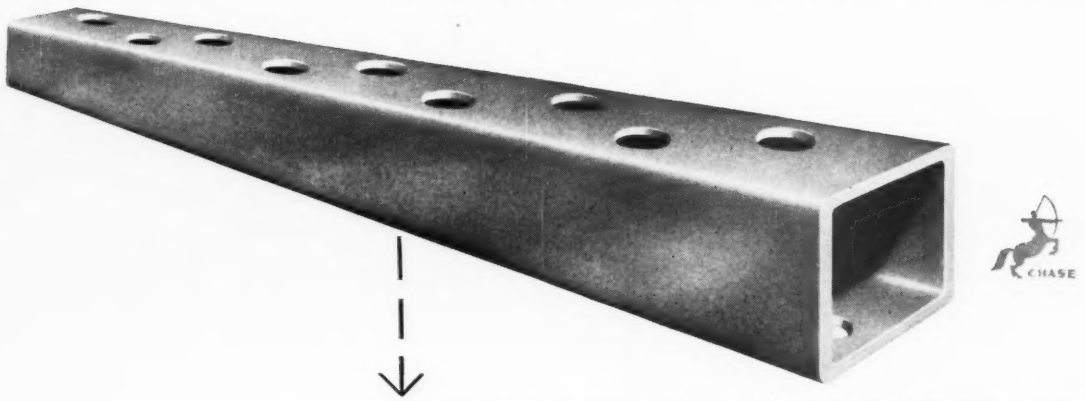
Engineering: James R. Kearney Corporation, St. Louis
Laminated Wood: Rilco Laminated Products, Inc., St. Paul, Minn.

SERVING INDUSTRY... MONSANTO CHEMICALS – PLASTICS WHICH SERVES MANKIND

Minimize Sag



with CHASE® COPPER BUS CONDUCTORS



they're stronger...for LONGER spans

Chase one-piece square copper tube buses have high mechanical strength in all directions. Large cross-sectional areas give them maximum structural strength. And that adds up to *longer spans between supports without unduly large sag.*

And, of course, Chase one-piece buses have the mechanical strength necessary to stand up under heavy short circuits.

For further information on Chase ventilated square tube, round tube and flat rectangular bus write for free Chase Bus Conductor Brochure.

FREE Chase Copper Bus Conductor booklet gives physical and electrical characteristics and data on copper saving.

Chase Brass & Copper Co., Dept. EW353
Waterbury 20, Connecticut

Please send me the
CHASE COPPER BUS CONDUCTOR BOOKLET.

Name_____

Position_____

Firm_____

Street_____

City_____ **State**_____

Chase BRASS & COPPER

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass & Copper

Albany†	Cleveland	Kansas City, Mo.	New York	San Francisco
Atlanta	Dallas	Los Angeles	Philadelphia	Seattle
Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	
Chicago	Houston†	Newark	Rochester†	(† sales
Cincinnati	Indianapolis	New Orleans	St. Louis	office only)

2 IN 1 PREMIUM BOOSTS 3 IN 1 BULB SALES

Sunday Newspaper Ads Break April 12th

Novel Bird Feeder-Ivy Planter Sells More Westinghouse 3-Bulb Cartons— Builds Load For You

Dealers' customers will rush to buy Westinghouse Light Bulbs soon as they see this unique little house in the Sunday Comics.

It's Bright! Colorfast! A plastic house with a planter cup and bird feeder basket. Indoors, it's a gay wall-hanging planter. Outdoors, it's a bird feeder with suet or bread in the feeder basket.

Dealers have no premium merchandise to handle. Customers send cash and wrapper directly to Westinghouse.

ONLY 50¢

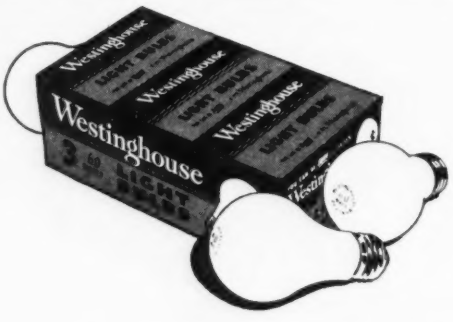
WITH ONE WESTINGHOUSE 3-BULB CARTON WRAPPER

Displays include "Sales-Catching" 14" x 17" Card

Get yours Now!

Get dealers to build special displays of Westinghouse 3-Bulb Cartons. They can dress them up with this card, plus the streamer and small "stopper" pieces they get in the Premium Display Kit. For details call your local Westinghouse Lamp Sales Office, or write: Westinghouse Lamp Division, Advertising Department, Bloomfield, N. J.

When they order two for $1.00 to make a double planter or bird feeder, they get wall bracket at no charge, and dealers will sell *two* Westinghouse 3-bulb cartons.



YOU CAN BE SURE...IF IT'S

Westinghouse

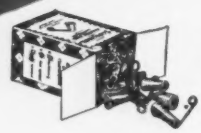
It's pretty satisfying to look at the bank of standby batteries in your battery room and know they're brim full of power . . . ready for any emergency today or tomorrow. That's the beauty of Gould Planté . . . they last practically forever because positive plates are made of *pure lead*. They contain *no* antimony to contaminate negative plates and shorten service life. To be certain of standby power *always* on tap . . . choose Planté— the "Aristocrat of Stationary Batteries."

You may be able to save up to 50% on maintenance costs throughout the life of your stationary batteries through the use of the Gould Plus-Performance Plan. Write Gould Battery Information Headquarters for full details.

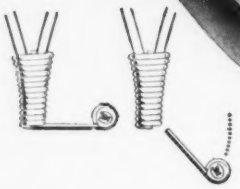
GOULD *Industrial Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries



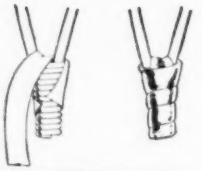
(1) "SCOTCHLOK" Electrical Spring Connectors fasten the wires together neatly and quickly! Just twist these tight-gripping spring steel connectors in place, then snap off the winding stem. See how the spring tension holds tight! "Scotchlok" won't shake loose. And it's neat, *compact!*



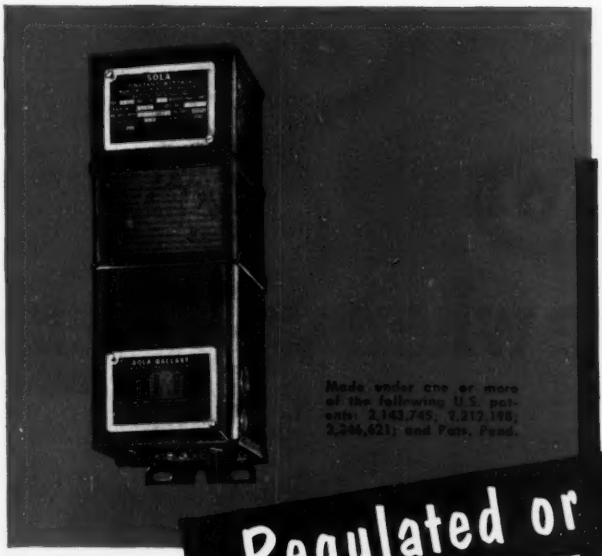
THE NEW 1-2 SPLICE

It combines two great "Scotch" products to give you the world's safest, most compact connection.

(2) "SCOTCH" Electrical Tape No. 33 insulates the splice *right!* Start by attaching tape to Spring Connector as shown, bringing it forward between the wires to seal up the bell end. Then wrap until tape extends ½-inch beyond small end. Fold extension over and wind tape back toward bell end. It's *permanent.* Order "Scotchlok" and "Scotch" Plastic Electrical Tape No. 33 today! Both carry UL seal.



The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

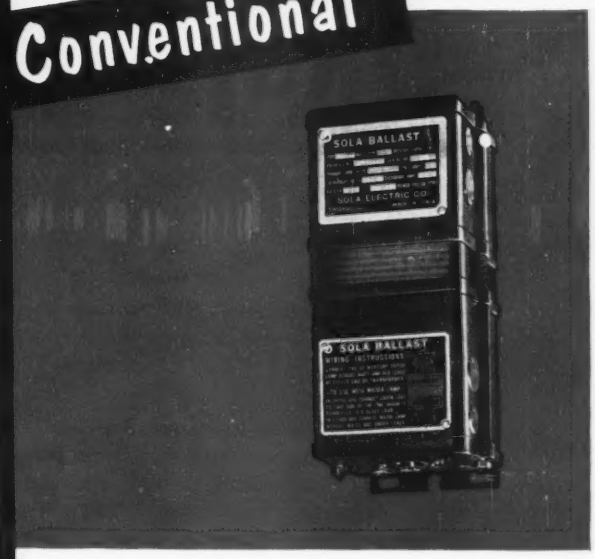


Made under one or more of the following U.S. patents: 2,143,745; 2,212,198; 2,246,621; and Pats. Pend.

Sola Mercury Vapor Lamp Transformers

Regulated or Conventional

for Indoor Lighting Installations



SOLA CONSTANT WATTAGE BALLASTS . . .

. . . continuously and automatically supply constant wattage within ±2% regardless of line voltage fluctuations as great as ±15%. This patented circuit results in the following advantages:

1. *Eliminates need for primary voltage taps*
2. *Assures positive lamp starting*
3. *Reduces line and lamp starting current surge*
4. *Eliminates voltage-drop lamp outages*
5. *Maintains constant lamp wattage, lamp current and light output*
6. *Extends lamp and transformer life.*

Single-lamp and two-lamp units are available for indoor operation of the 400 watt type H-1 mercury vapor lamps.

SOLA CONVENTIONAL-TYPE BALLASTS . . .

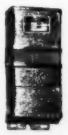
. . . are premium quality, non-regulated auxiliaries at moderate prices. They are designed and produced to the same high standards of quality as the Constant Wattage types.

Typical quality features include: the Sola pressed-in-core construction, leads fastened to sturdy lug straps, not merely coil ends . . . high vacuum varnish impregnation . . . pryout in each end cover exposing a ½" threaded conduit fitting . . . ½" and ¾" knockouts . . . large access panels to roomy wiring compartments.

They are available for single-lamp operation of the 400 watt type H-1 mercury vapor lamps. Three primary voltage taps are provided for proper matching to various line voltages, insuring operation at lamp ratings and resulting in full light output.

Write for complete electrical and mechanical specifications

Regulated Outdoor



Regulated Indoor

Conventional Indoor

SOLA *Mercury Vapor Lamp* **TRANSFORMERS**

SOLA ELECTRIC CO., 4633 W. 16th Street, Chicago 50, Illinois. Bishop 2-1414 • NEW YORK 35: 103 E. 125th St., TRafalgar 6-6464
PHILADELPHIA: Commercial Trust Bldg., Rittenhouse 6-4986 • BOSTON: 240 Walnut St., Newtonville, Mass., DEcatur 2-3510
CLEVELAND 15: Guardian Bldg., [illegible]

Your costs go down all along the line when you specify

Rome Aluminum

Whether it's secondary and service drop cable or weatherproof wire for primary circuits, you get a host of cost advantages with Rome Aluminum.

Low installation and maintenance costs

You can string longer spans with fewer poles because its mechanical design and light weight reduce sag tendencies. It gives you greater protection against wind and ice loading. It reduces tree trimming and cuts labor costs during installation.

You need fewer accessories for secondary and service drop cables because of Rome Aluminum's Triplex construction. This also assures a neater, cleaner installation.

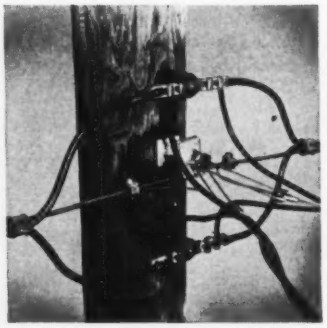
Maintenance costs are down, too. Conductors are easily accessible because Rome Triplex requires no common covering.

Long service life

And you can count on long service life. Aluminum itself is a long-life conductor material. RoPrene (Neoprene) and RoLene (polyethylene) insulation have exceptional resistance to weather and abrasion. Replacement is minimized. There are no braids to rot or festoon.

Take advantage of the savings inherent with aluminum itself . . . and the results of years of exhaustive research and testing by technically skilled, progressive Rome engineers. Ask your Rome salesman about Rome Aluminum on his next visit.

Light weight of Rome Aluminum Triplex permits easy installation, cuts labor costs, reduces sag, minimizes ice loading.

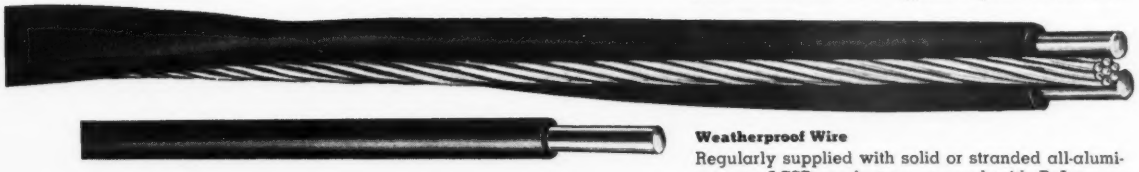


Here is a typical service tap connection at the pole . . . only one of several types of connections which can be made.

Dead end formed around bare neutral messenger of Rome Aluminum Triplex make house connection. Also meets industry requirements.

Triplex Self-supporting Secondary and Service Drop Cable

Regularly supplied with stranded or solid all-aluminum power conductors, insulated with RoPrene (Neoprene) and ACSR or other suitable bare neutral messenger. All-aluminum, copper or copperweld messengers are also available. RoLene (polyethylene) insulation can be supplied in place of RoPrene.



Weatherproof Wire

Regularly supplied with solid or stranded all-aluminum or ACSR conductors, covered with RoLene or RoPrene. Conventional URC triple braid covering can be supplied.

It Costs Less to Buy the Best

Rome ALUMINUM

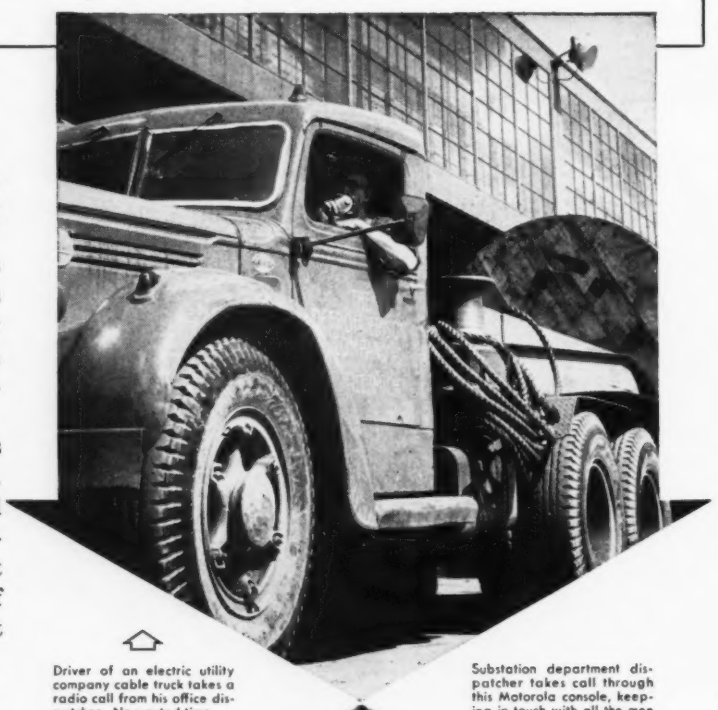
ROME CABLE CORPORATION, ROME, N.Y., AND TORRANCE, CALIF.

How Motorola 2-Way Radio *pays for itself* in Savings!

MORE AND MORE ELECTRIC COMPANIES ARE IMPROVING CUSTOMER SERVICE—SAVING MONEY DOING IT!

In any fast moving operation that takes swift, surely accurate timing of all crews and equipment, look to Motorola 2-way Radio as step one in promoting extra efficiency, economy and new operational profit!

As an investment, too, Motorola puts first emphasis on *your profit interests.* This equipment is Motorola-engineered throughout to give you top performance at lowest operating expense. It also gives you the protected value of obsolescence-proof equipment that stays up-to-date for years to come.

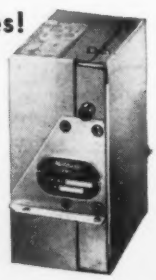


Driver of an electric utility company cable truck takes a radio call from his office dispatcher. No wasted time . . . no waiting for instructions!

Substation department dispatcher takes call through this Motorola console, keeping in touch with all the men on the road . . . instantly!

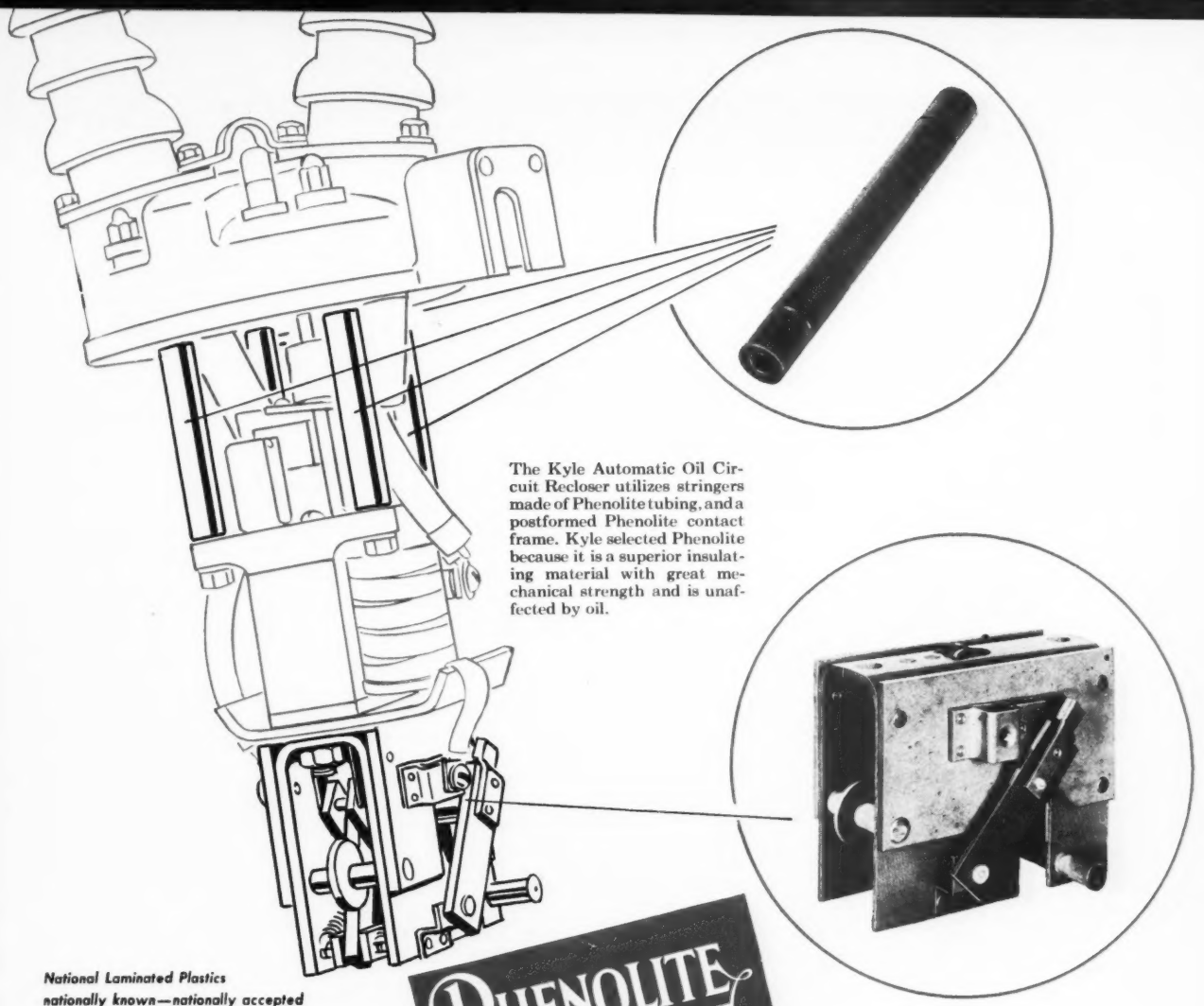
Just one of many Motorola advantages!

Exclusive Motorola Sensicon Permakay filter keeps your radio sets permanently "on the beam" . . . ends 15 costly tuning adjustments forever!



Motorola®
Communications & Electronics, Inc.
A SUBSIDIARY OF MOTOROLA, INC.
900 N. Kilbourn Ave., Chicago 51, Illinois
Rogers Majestic Electronics Ltd., Toronto, Canada

Photos courtesy of the Detroit Edison Company



The Kyle Automatic Oil Circuit Recloser utilizes stringers made of Phenolite tubing, and a postformed Phenolite contact frame. Kyle selected Phenolite because it is a superior insulating material with great mechanical strength and is unaffected by oil.

National Laminated Plastics
nationally known—nationally accepted

PHENOLITE
Laminated PLASTIC

contributes to an improved product— in the Kyle Automatic Oil Circuit Recloser

This practical use of Phenolite by the Kyle Products Plant of the Line Material Company is typical of its countless applications in the electrical field. Phenolite, about one-half the weight of aluminum, is the perfect insulating material for high and low voltage applications. It possesses an unusual combination of properties. Phenolite has great mechanical strength and high resistance to moisture; ready machinability; is unaffected by solvents and oils.

It can be easily punched, sawed and sheared. The toughness and high impact strength of cloth base Phenolite sheet make it suitable for gears; it is one of the strongest materials per unit weight known.

Available in various grades and colors; and in sheets, rods, tubes and special shapes. Write for detailed literature and engineering information—

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The Tool and the Sleeve

that are made to work together

together they make the perfect splice

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Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

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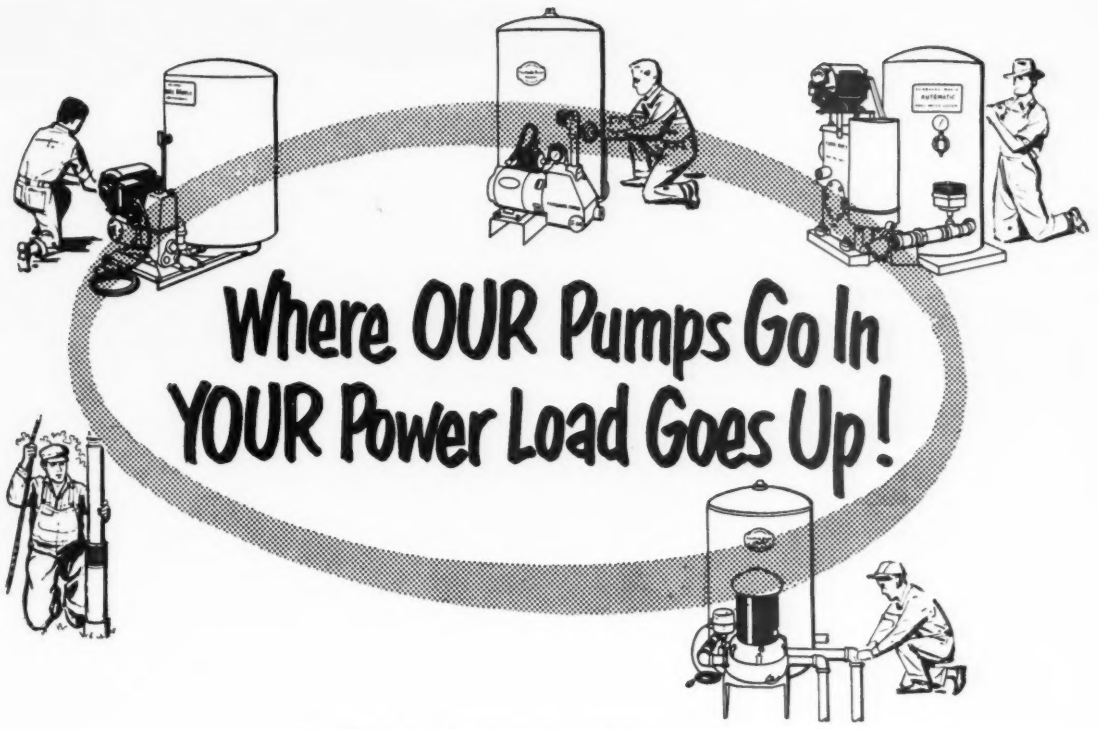


Where OUR Pumps Go In YOUR Power Load Goes Up!

Usually the first home utility bought by a new high line customer is an electric water system.

With this basic utility installed in the home, a woman becomes the world's best prospect for many other load-building appliances—a water heater, washer dryer, ironer; garbage disposal unit, an electrically-controlled heating system, and an automatic dish washer.

Her husband also buys load-building appliances. Often he installs a water heater in the milk house before his wife enjoys one in her home. He buys electrically operated water tank heaters and automatic waterers. And he may even install a *second* electric pump for farm operations only!

FAIRBANKS-MORSE

a name worth remembering when you want the best

WATER SYSTEMS • GENERATING SETS • MOWERS • HAMMER MILLS • PUMPS
MAGNETOS • MOTORS • SCALES • DIESEL LOCOMOTIVES and ENGINES

What you ought to know about our water systems

Since electric water systems are *big* factors in helping you build up power loads, you ought to know all about them. So we've thought of ways to help you. First, we'll be glad to supply you with educational wall chart selection guides, and booklets showing types of pumps, their capacities and uses. Second, we'll loan you slide films showing installations of a new submersible pump. For complete details, mail the coupon!

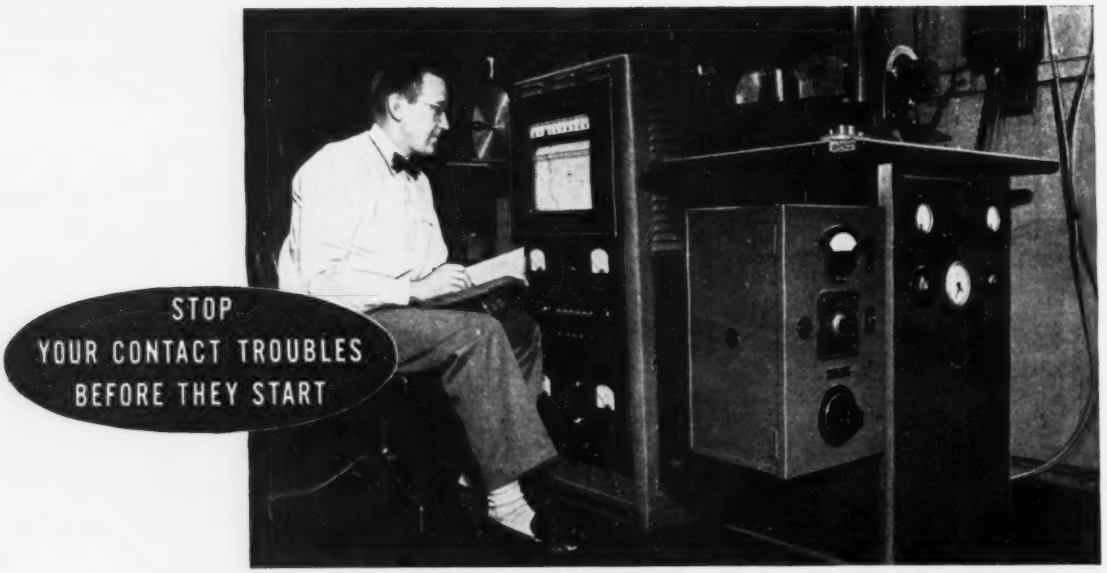
Fairbanks, Morse & Co.
600 S. Michigan Ave., Chicago 5, Ill.

Please send a representative to show us how to use your wall charts and interpret your literature on home water systems.

Name .....

Address .....

City ..... RD .... State .....



X-ray diffraction equipment in the Mallory Contact Engineering Laboratory. It is so sensitive it will identify contaminating films of less than a hundredth of a micron.

Less Than a Hundredth of a Micron!

The slightest trace of contaminating films on contact surfaces can be identified by X-ray diffraction equipment.

In a contact, trouble can be a lot of things. The paper used in packaging, the type of glue on sealing tape, insulation on a wire, atmospheric conditions . . . are just a few of the many things that can deposit a contaminating film on contact surfaces.

Because we have the equipment to identify contaminating films, we can track trouble to the source and correct it. This same X-ray diffraction equipment is also used in the development of new contact materials, by identifying unforeseen formations that may develop during production processes. It is used in life test work to study gradual changes taking place.

This is but one example of the complete facilities that are ready to go to work on your contact problems . . . whether it is a simple button contact or complex contact assembly that is involved. If you would like to improve the contacts in your products or produce them at lower cost, get in touch with us at your first opportunity. Our engineers will be glad to talk to you . . . answer your questions.

Expect more . . . Get more from **MALLORY**

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

P.R. MALLORY & CO. Inc.
MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:
Electromechanical — Resistors • Switches • Television Tuners • Vibrators
Electrochemical — Capacitors • Rectifiers • Mercury Batteries
Metallurgical — Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO. INC., INDIANAPOLIS 6, INDIANA

When Reheat is Considered...

take a close look at this specific Kellogg experience!

To date the company's books show *36* reheat jobs both here and abroad. Some of these have been completed . . . several are underway . . . and others are yet to be started—but they all add up to a major percentage of all reheat systems—including those operating and those to be built.

In addition to this specific experience on, complicated reheat jobs, Kellogg approaches each new power piping project with a background that includes the fabrication of piping for scores of main steam installations which are today producing more than 6¼ million KWs...and operating at temperatures ranging up to 1050°F...and higher. One of the more recent jobs turned out in the Kellogg fabricating shops included the stainless steel main steam piping for a reheat system which will operate at 1100°F and 2350 psig.

The metallurgical "know-how" required to bend this material...to weld sections into fault-free sub-assemblies...and to accurately heat treat is the result both of experience and specific development work. Kellogg pioneered special welding electrodes and special welding techniques for Stainless 347...and such work is one of the fundamental reasons why Kellogg is specified again and again by important companies for critical power piping jobs all over the world.

These leading companies are among the many major producers of power who use

M. W. KELLOGG POWER PIPING...

- American Gas & Electric Service Corp.
- Boston Edison Co.
- Central Hudson Gas & Electric Co.
- Chaudronneries A. F. Smulders (Belgium)
- Compania Argentina De Electricidad
- Compania De Fuerza Del Suroeste De Mexico S.A.
- Consolidated Edison Co. of N. Y.

OTHER FABRICATED PRODUCTS including: Pressure Vessels...Vacuum Vessels...Fractionating Columns...Drums and Shells...Heat Exchanger...Proccess Piping ...Bends and Headers...Forged and Welded Fittings...Concrete and Radial Brick Chimneys

For further information, details of methods, etc. contact

FABRICATED PRODUCTS DIVISION

THE M. W. KELLOGG COMPANY

225 Broadway, N. Y. 7, N. Y.

or offices in Jersey City, Buffalo, Los Angeles

Tulsa, Houston, Toronto, London and Paris

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HIGH PRESSURE
POWER PIPING

It's a Fact EVERY G-E 2-WAY RADIO CRYSTAL IS TESTED FOR DRIFT AND ACTIVITY FROM MINUS 22 TO 185 DEGREES FAHRENHEIT

THE all-important crystal supplied in your G-E 2-way radio equipment earns a performance diploma that more than qualifies it for the rugged service you demand in communications. Subjected to testing in the complete range from sub-zero to "hands off" temperatures, the crystal is painstakingly checked for frequency drift and activity. Crystals which drift more than *two-thousandths of one percent* are rejected! Those which fail G-E's stringent activity tests are also discarded.

G.E. starts crystal manufacturing process with x-ray selection of only the finest, faced Brazilian quartz and, in the final assembly, employs cleaning methods that are unique in the industry today. This somewhat lavish and exceptionally thorough preparation is justified by the key position crystals occupy as the *heart of 2-way radio and microwave equipment!*

The end result is a crystal which is typical of the high-quality components used in G-E equipment—units that are sought after not only for *performance* but for *low maintenance costs . . . economy of operation.*

Production facilities for G-E crystals are geared to supply this superior product to manufacturers who demand quality crystals for other uses. Write for complete information: General Electric Co., Section 1933-23, Electronics Park, Syracuse, N.Y.

Call the nearest G-E office for data on this outstanding communications equipment—

Dallas, Texas	Denver, Colorado	Washington, D.C.	Daytona Beach, Fla.	Cincinnati, Ohio
Houston, Texas	Kansas City, Mo.	Boston, Mass.	Detroit, Michigan	Chicago, Illinois
Tulsa, Okla.	New York, N. Y.	Atlanta, Georgia	Columbus, Ohio	Indianapolis, Ind.
New Orleans, La.	Syracuse, N. Y.	Charlotte, N. C.	Pittsburgh, Pa.	Minneapolis, Minn.
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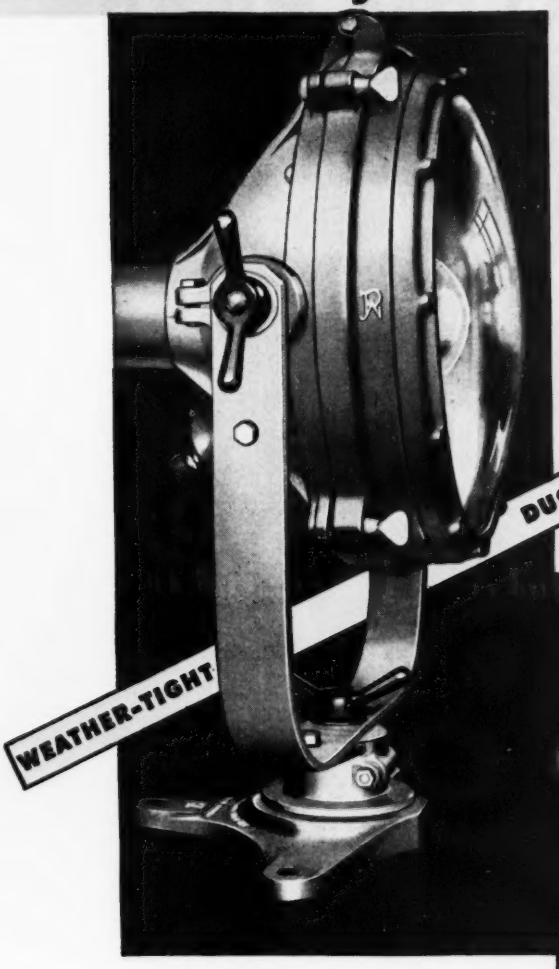
Follow the trend . . . replace with G.E.!

GENERAL ELECTRIC

Consider the years ahead!



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PYLE-NATIONAL

ENCLOSED FLOODLIGHTS

Oil Refinery, Oklahoma, 1925

Don't economize on the initial cost when planning a floodlight installation. It is the elimination of large maintenance, repair and replacement expense that counts.

Sealed against moisture and dirt, constructed throughout of rugged, corrosion-proof materials, Pyle-National floodlights retain their original high-efficiency output throughout an exceptionally long service life, with negligible maintenance and replacement expense.

The earliest Pyle-National floodlighting installations are still operating in excellent condition, with ***over a quarter of a century*** of efficient, economical service to their credit! Convincing proof of the value of quality, enclosed floodlights.

Write for catalog 2100, which gives a complete description of our extensive line of heavy duty floodlights.

The services of our experienced floodlighting specialists are available at all times to advise and assist in installation problems.

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putting a HALO on MICAH...

the halo signifies distinguishing virtues — and Micah is just a symbol for Macallen Mica — it has earned a halo — it is really good — dependably good.

NO ONE EVER USES MICA INSULATION EXCEPT WHERE IT IS A MUST — AND THERE MACALLEN MICA CAN BE DEPENDED UPON.

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ALL FORMS, ALL QUANTITIES — ALL DEPENDABLE

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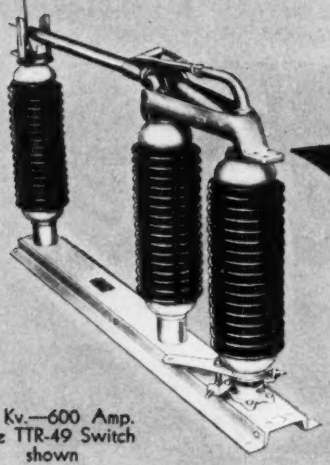
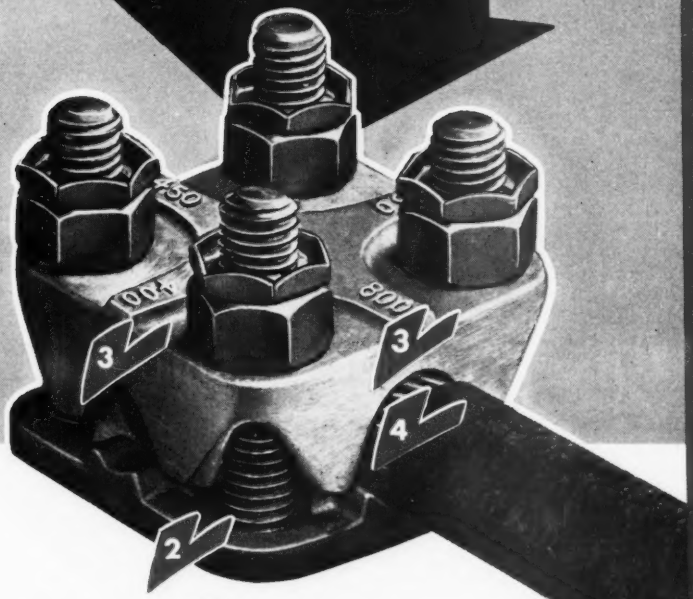


69 Kv.—600 Amp. type TTR-49 Switch shown

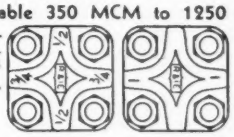
R&IE UNIVERSAL TERMINAL CLAMPS

A feature found on all R&IE switches



Check the facts...

1. They combine many odd sizes of clamps for wire, cable and tubing—eliminate specifying diameters except for special conductor requirements.
2. Mounts on terminal pad with four half inch bolts on 1¾" centers.
3. Choice of clamp position doubles conductor range for each clamp. Note a 90° change in position can be made for quick selection of either of two indicated range sizes.
4. Overlapping sides of clamping cradle hold cable strands together.
5. Two clamps for specified conductor sizes — Cable 350 MCM to 1250 MCM, Tubing— ½ inch and ¾ inch, and 1 inch.



6. Only three clamps cover full conductor range — Wire No. 4 to 4/0, Cable No. 4 to 800 MCM, Tubing ⅜ inch to ¾ inch.

R&IE EQUIPMENT DIVISION
I-T-E Circuit Breaker Co.
GREENSBURG, PENNA.

The Check List

DISCONNECTING SWITCHES
INDOOR AND OUTDOOR

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SWITCHING EQUIPMENT

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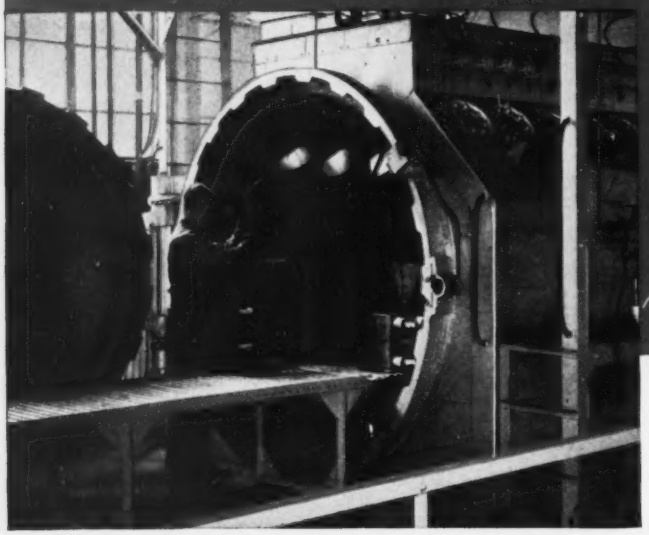
Get all 4 advantages



ALLIS-CHALMERS
INSTRUMENT
TRANSFORMERS

1. *Insulation completely protected against air and moisture*
2. *No insulating liquids to maintain*
3. *No leakage — simplified storage and handling*
4. *High dielectric strength*

VACUUM-PRESSURE PROCESS ADDS YEARS TO INSTRUMENT TRANSFORMER LIFE. In the chamber shown above, Allis-Chalmers vacuum-pressure compound-filling process makes the core and coil assembly and its insulation a solid, compact unit within its case. As a result, insulation is completely protected against outside air and moisture. High dielectric strength is assured. And transformer maintenance is greatly reduced.

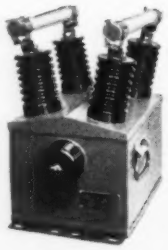
HERE'S HOW IT'S DONE

Two steps do the job. First, a combination of high vacuum and heat drive moisture from the core and coil assembly. Then, while the vacuum is maintained, the case is filled with hot compound which is chemically stable and free of absorbed gases and impurities. This draws hot compound into the innermost parts of the assembly, preventing local ionization and extending normal insulation life.

ELIMINATES PERIODIC TESTING

Since compound-filling eliminates insulating liquids, periodic inspections can be reduced. There is no need for filtering or testing liquids. Storage and handling are simplified because there is nothing to leak out. It is easy to see why you save money and trouble. Why not call your nearby A-C district office today and get more information. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Outdoor current transformers, Type KO, rated up to 15 kv and 1800 amp.



Indoor potential transformers, Type PD, rated up to 14,400 volts, 200 va, fused or unfused.

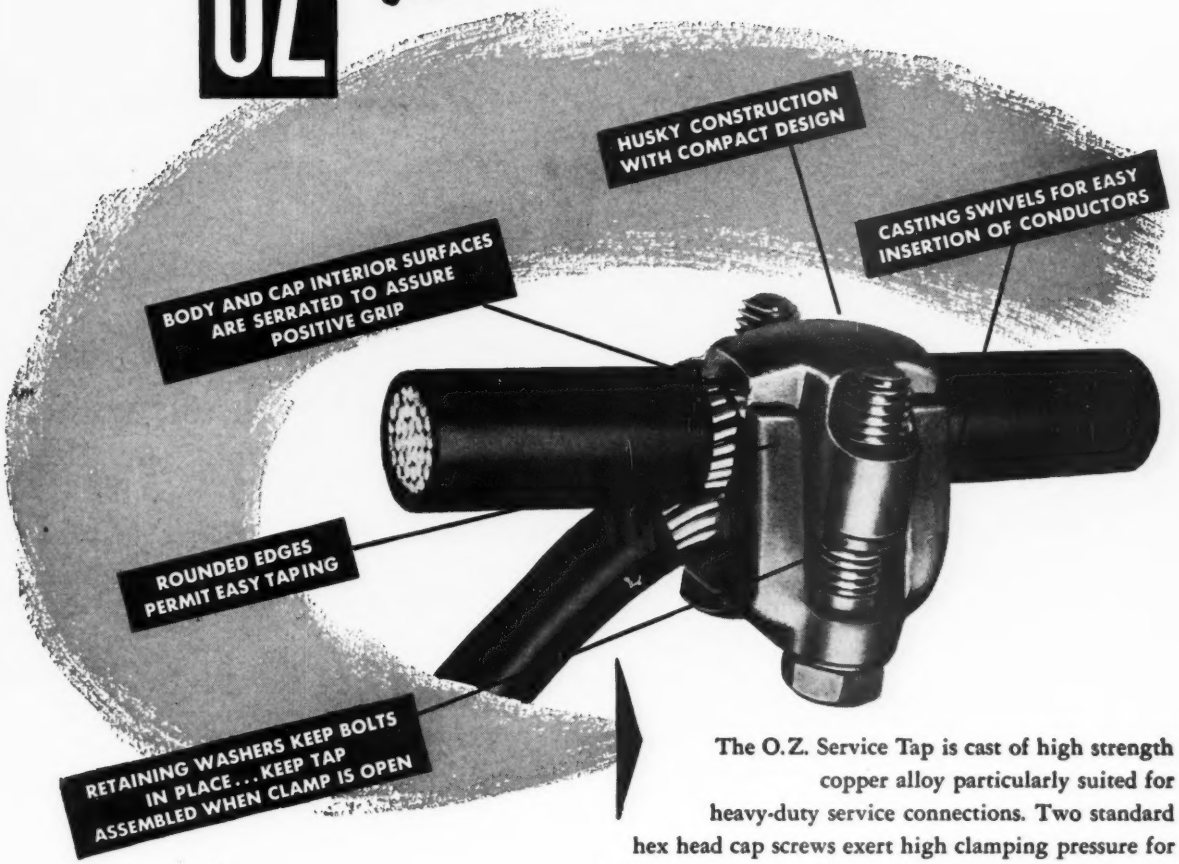
Outdoor potential transformers, Type PWD, rated up to 15 kv, 200 va.

A-3978

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

O-Z SERVICE TAP
better from every angle


HUSKY CONSTRUCTION WITH COMPACT DESIGN
CASTING SWIVELS FOR EASY INSERTION OF CONDUCTORS
BODY AND CAP INTERIOR SURFACES ARE SERRATED TO ASSURE POSITIVE GRIP
ROUNDED EDGES PERMIT EASY TAPING
RETAINING WASHERS KEEP BOLTS IN PLACE... KEEP TAP ASSEMBLED WHEN CLAMP IS OPEN

The O.Z. Service Tap is cast of high strength copper alloy particularly suited for heavy-duty service connections. Two standard hex head cap screws exert high clamping pressure for low resistance connections. O.Z. bonus features guarantee service and satisfaction. And remember—O.Z. costs no more!

Available in sizes from #2 to 1000Mcm (Main) #10 to 1000Mcm (Tap). Can be furnished with spacer if desired for separating individual conductors. Will take two maximum size cables or one maximum and one smaller size. Excellent for dead-ending wires.

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CONDUIT FITTINGS
CABLE TERMINATORS
CAST IRON BOXES
SOLDERLESS CONNECTORS
POWER CONNECTORS
GROUNDING DEVICES

1604

Clarence Springer introduces you to--

BUILDING BIG BUSHINGS is a small part of Clarence Springer's job. His major job . . . the job that takes most of his time and ability . . . is seeing to it that Locke insulators remain well ahead of the field . . . in efficiency of product design . . . and reliable performance. With men of Clarence Springer's experience standing behind the performance characteristics of Locke insulators, is it any wonder that leading utilities prefer them . . . specify Locke at every opportunity!

Designed and built by

LOCKE

"...picked for the job," says Clarence, "because of Locke's success with similar projects...and because of its extensive research, test and manufacturing facilities."

"Rarely," says Clarence, "has a manufacturer of electrical porcelain insulators been assigned a job as unusual and exacting as that of designing and building this big, complicated antenna lead-in bushing. To the best of my knowledge," he says, "it's the only bushing of its size and type in existence."

As Clarence tells the story, "Since nothing like it had ever been built before, plenty of original research and development work was required."

"However," says Clarence, "special assignments involving extensive research never seem to bother us. Our big advantage is the fact that our insulation research, test and manufacturing facilities are among the world's finest and largest."

"These facilities give us the tools with which we can lick the toughest kind of problems in porcelain engineering."

"Our success with special projects like this," says Clarence, "must be comforting to users of Locke Suspension, Switch, and Pin Type insulators. As I see it, a fellow can relax when he knows that the same skills, facilities and experience which produced this bushing . . . are always at work building reliable performance into the Locke insulators already on his lines, or on order."

"Leading utilities seem to feel that way about it," observes Clarence. "Judging by the number of insulators going out of here every year, you get the impression that utilities have practically unlimited confidence in Locke insulators. And," adds Clarence, "this confidence is well placed. Utility Service records prove it."

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

"Probably the world's biggest bushing," says Clarence, "and truly a marvel of porcelain engineering."

Type: Antenna lead-in bushing.

Weight: 6,500 lbs.

Overall Length: 26 feet.

Flashover: 60 cycle dry and wet flashover voltage of either end nearly the same . . . about 750,000 volts.

Internal Dielectric Strength: At least 350 kv. and capable of operating at 300 kv. low frequency radio voltages . . . corona free up to breakdown voltage.

Internal Insulation: Dry nitrogen under pressure holding dielectric losses to minimum.

Bushing Interior: Aluminum alloy tube $10\frac{1}{4}$" outside diameter by 24 feet long runs entire length of interior. Six copper conductors, with neccessary parts, occupy inside of tube.

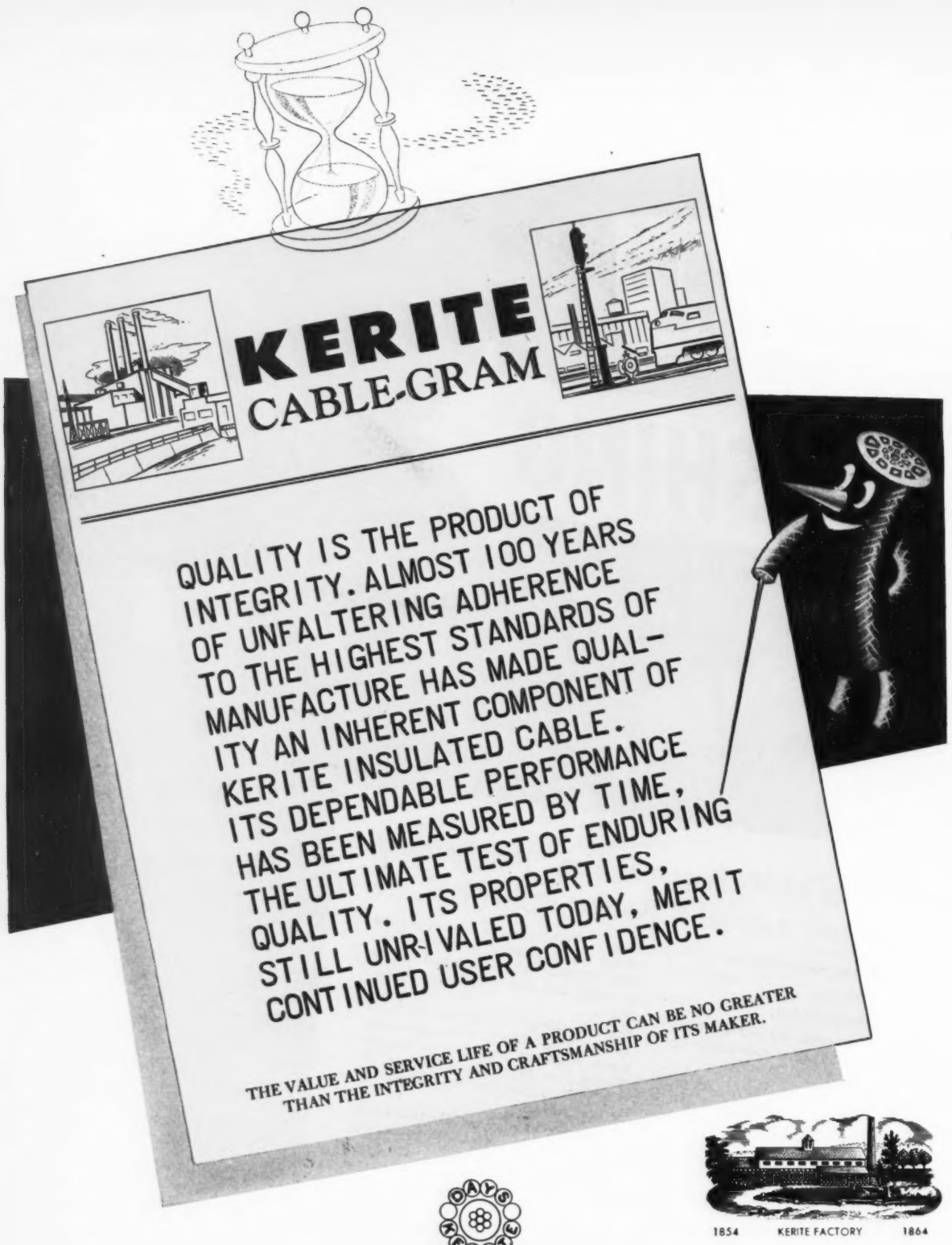
Shielding: Combination rain, falling ice and corona shield has 8-foot diameter. Tubular outer ring of corona shield 10" in diameter at its cross section. Shield keeps upper half of top porcelain dry with rain falling at 45° angle.

Top of Bushing: (outdoor part)—About 10 feet long. Made of two porcelain parts clamped together at flange. Tapers from $14\frac{1}{2}$" inside diameter at small end to about 30" inside diameter at bottom end.

Indoor Part of Bushing: Like top except porcelains are inverted with petticoats sloping toward small end.

Metal Parts: All of non-magnetic material to keep electrical losses at a minimum. Bolts, nuts, washers of stainless steel. All other parts of either cast or wrought aluminum, copper conductors excepted.

Note: Bushing is shown in test frame in the Fred M. Locke High Voltage Laboratory.


KERITE
CABLE-GRAM
QUALITY IS THE PRODUCT OF INTEGRITY. ALMOST 100 YEARS OF UNFALTERING ADHERENCE TO THE HIGHEST STANDARDS OF MANUFACTURE HAS MADE QUALITY AN INHERENT COMPONENT OF KERITE INSULATED CABLE. ITS DEPENDABLE PERFORMANCE HAS BEEN MEASURED BY TIME, THE ULTIMATE TEST OF ENDURING QUALITY. ITS PROPERTIES, STILL UNRIVALED TODAY, MERIT CONTINUED USER CONFIDENCE.
THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.
1854 KERITE FACTORY 1864

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.

Commercial Cooking Asks for Attention

Electric utility top management is neglecting an important source of profitable revenue. There are exceptions to this broad statement, of course, but in general it applies. This is the firm opinion of that devoted band of brothers who comprise the Commercial Cooking Committee of the Edison Electric Institute. Before making the survey of promotion of commercial electric cooking reported in this issue, Electrical World editors were inclined to share their opinion. They now proclaim complete adherence to it.

Is "neglecting" too strong a word? It does not seem so, not when less than one third of the utilities to whom the survey form was sent reply that they are promoting this load.

Is this load a "source of profitable revenue"? Taking demand and coincidence factors into account, the average of over $20 annual revenue per kilowatt of connected load disclosed in analysis of survey replies must mount up to a very happy figure relative to cost of system capacity required.

It was expected that the survey would disclose a conspicuous absence of combination utilities from the ranks of those promoting commercial electric cooking. But this did not show up strongly in the replies. More than one quarter of the utilities reporting promotion are combination. And of combination utilities replying, nearly one half reported promotion. This was a pleasant disappointment even though it is a moral certainty that such promotion is confined to non-gas service areas.

A much less agreeable disappointment resulting from the survey lay in the proportion of straight electric utilities promoting this load. There is no reason of investment protection —nor any other apparent reason—to prevent these utilities from going after commercial cooking load. One would have thought that all of them would be doing so. But they are not; the proportion is three out of five. The only inference that can be drawn from this condition is that two out of five are not interested.

More weight is added to this unhappy conclusion when it is considered that nearly half of the utilities addressed in the survey did not reply. It must be assumed that the preponderant reason for non-reply is lack of interest, which can mean nothing else than no promotion. Thus it is indicated that more than two out of five, probably more than half, of the straight electric utilities are not promoting commercial cooking. Again, is "neglecting" too strong a word?

If commercial cooking were a difficult load to sell, if the cost of its acquisition were high in relation to its revenue potential, one could understand why it is not getting the attention it deserves. But it is not too hard to sell; and as the survey report shows, its annual revenue stacks up excellently against its sales expense. Probably the explanation is that management has been so busy with some things that other things have had to wait. Maybe the results of this survey will help to transfer commercial cooking from the "other" to the "some" things class.

Let's All Give the 'Hi-Sign'

This Northern States Power Co truck driver is giving the "hi-sign." To pedestrians and motorists in the company's service area it means that the driver is yielding to them the right of way. The gesture is part of the company's program to promote courtesy as a means of reducing traffic mishaps. As the company says, on stickers now carried by all its vehicles, "Courtesy Is Contagious."

APPA Wants Preference Not Equity

What is going to happen to the power from the St. Lawrence when the project becomes a reality instead of a controversy?

Public power advocates are thumping for the federal government's "preference clause"—This gives priority to municipal, rural cooperatives, and other public power systems. The authority is equally adamant in its stand for its own "preference clause." This gives priority to all rural and domestic consumers regardless of the supply agency.

The authority's lawyer at recent hearings before a FPC examiner propounded this viewpoint:

"Mr. Examiner. We say that the New York plan, which makes this low-priced current available to all rural and domestic consumers, regardless of the entity from which they buy, is more equitable than a preference for municipalities and cooperatives which may not be restricted to rural and domestic use."

The American Public Power Association, which has intervened, favors preference for the municipals and co-ops. They just ask for a mere 10% of the output from St. Lawrence. This they say would replace the power purchased in 1948. They also want a preference. This would take another 10% of the output based upon 1948. If the system loads of municipals have grown as those of other utilities have, it would take another 10% to carry today's loads. If the preference stands, by 1970 they would get the entire output.

The authority readily admits that under its plan the public power systems may not get their full requirements. As Chairman John E. Burton testified:

"Will we be equalling the full requirements? No, we will not. There will be an equitable treatment of all systems, according to the rural and domestic consumers that they have or serve."

And try as we can, we can find nothing unfair with a plan that provides "equitable treatment of all systems" and one that does not favor a group of non-taxpayers over a group of taxpayers.

The Contractor Belongs in the Family

That the electrical contractor "has been, still is, regarded as a sort of step-child" by the rest of the electrical industry was remarked by Edward J. White in his article, "Contractors Discover the Values of Selling," Electrical World, Dec. 29, 1952.

But the contractor does not want to be looked upon as a stepchild, nor should he be. He is truly a member of the family. But he has been almost a pariah for so long that it will take more than welcoming words to make him feel that he really belongs. It will take friendly association, working together, mutual interests, for which opportunities must be sought and made.

One such opportunity was immediately recognized by C. J. Berry, manager of the Lighting Service Department of the Consolidated Gas, Electric Light & Power Co of Baltimore, when he looked over the January issue of our sister publication, "Electrical Construction and Maintenance." In it is announced a prize competition for lighting installations by electrical contractors. Right away he wrote to the editor. He said he had in mind getting out a letter to contractors in his area, drawing their attention to the competition and offering assistance in layout and design of installations and in preparation of entries. And did the editor have any suggestions to help the good work along?

Another instance of seeing opportunity is the practice now getting going in Detroit and which is briefly described on Page 5 of the Feb. 2 issue of Electrical World. Utility service men finding trouble that needs attention of a contractor don't just tell the customer to call one. They leave a card on which the nature of the trouble is indicated and which instructs the customer to call the Electrical Association if he does not know a contractor. The association passes the call on to a competent contractor who then gets in touch with the customer.

A third example comes from the Philadelphia Electric Co. This company sells to contractors an inexpensive envelope stuffer or mailing piece that tells prospects to "Consult First with a Recognized Electrical Contractor" before buying equipment or making any other commitment for an electrical installation. The first run of these pieces, 15,000 was quickly sold out. A second and larger printing is disappearing just as fast.

These three cases are the kind of friendly cooperation that will convince the electrical contractor that he is no stepchild but a real member of the family. And the electrical industry family is one family that the nation can't afford to have anything but big, happy, and prosperous.

THE ELECTRICAL WEEK

The Issue's News Highlights—Supreme Court decision in Roanoke Rapids case favors Virginia Electric & Power Co and FPC. Vepco's license is upheld, which means company can build hydro project on Roanoke River even though Interior has staked out the basin for federal development.

Claude Wickard resigns as REA administrator after he learns an Administration move is afoot to fire him.

Off the Washington Wire—Word here is that material priorities may remain in effect after June 30 for certain power projects vital to atomic energy program, but Depa doesn't know the setup yet . . . Interior's request that Oxbow hearings be postponed is being interpreted here as a sign that the department may come up with some sort of plan for federal construction of the Hells Canyon project. FPC has now set May 13 as date for the beginning of hearings in Washington on Idaho Power's application to build Oxbow.

Virginia E&P says it expects to resume work within a month on its Roanoke Rapids project now that the Supreme Court has reaffirmed the license . . . REA has approved an additional $2.1 million loan to Illinois Rural Electric Co of Winchester for installation of two diesel units, more transmission and distribution lines.

SEC invites comments on its rule U-45(B) which regulates allocation of federal income taxes among companies of a registered holding company when a consolidated tax return is filed. Rule requires any savings to be allocated among system companies in proportion to amount they would have paid on a separate return basis. Comments should be in by April 15.

Addressing the New York Society of Security Analysts recently, South Carolina E&G's Pres S. C. McMeekin stated that his company expects to earn $1.07 a common share in 1953 and $1.62 a share in 1954 because of increased revenues from atomic energy plant.

New York State Power Authority Chairman John E. Burton says power authority will make every effort to win Congressional approval of its plan to develop Niagara River. He said he doubted Congress would okay a plan for development by private utilities, although earlier E. J. Machold, Niagara Mohawk Power president, declared he was confident five New York private utilities would get authorization to undertake the development . . . New York Governor Dewey sends to the Senate the names of Burton, Wyman S. Bascom, and Hickman Powell to be reappointed members of the State Power Authority.

From New England—Four gas turbines, totaling 20,000 kw, for Connecticut L&P's northern and eastern territory, are expected to be in operation between July and early fall. Company is changing its truck fleet colors from deep red to chrome yellow for increased visibility by day and night . . . Narragansett Electric is planning to build 250,000-kw initial capacity steam plant on Narragansett Bay, North Kingstown. Ultimately eight 125,000-kw units are envisioned.

Labor—Western Massachusetts Electric grants 6¢ wage increase to its organized workers . . . Michigan Gov G. Mennen Williams names Dr William Haber, University of Michigan professor, Ann Arbor; Edward C. McCobb, Grand Rapids attorney; and Paul T. Sorensen, Muskegon attorney, to a commission panel under the Bonine-Tripp law. This was necessary when the UWUA, CIO, local unions rejected increases of 5¢ to 8¢ an hour offered by the company. Union had originally asked for 25¢ an hour but this had been trimmed to 15¢. Commission panel is slated to meet on March 24. In 1952 a brief Easter Day strike ended when the governor named a commission and employees eventually were given 18¢ an hour hike.

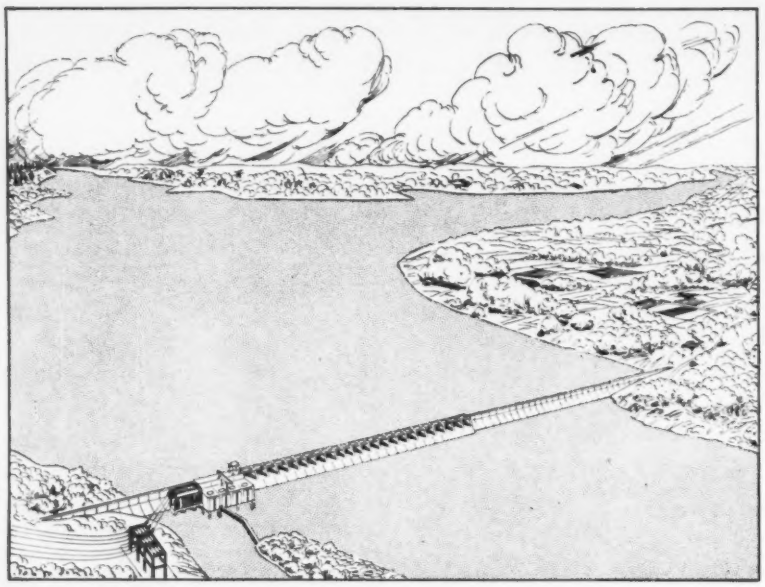
Rates—Boston Edison wins a long-fought battle before Massachusetts Department of Public Utilities, which rules in 66-page decision that company should not be compelled to sell electricity to other than authorized utilities for resale to others . . . Peabody, Mass., Electric Light Department cuts residential and commercial rates. Home users in 100-kwhr category will pay $3.28 instead of $4.27 per month. Merchants in 500-kwhr bracket will pay $24.50 instead of $27.

Lake Erie Electric Cooperative, Inc, gets informal Ohio PUC approval to buy Martin's EL&P for $25,000. Co-op is now seeking REA loan of $200,000 to permit extension of service to portions of Kelley's Island now without electricity . . . Iowa Public Service gets FPC approval to purchase about 55 miles of 161-kv line to be built in Iowa by Kansas City P&L for $990,000 . . . A citizens committee, headed by T. J. Armstrong of Chadds Ford, Pa., is fighting proposed plan of Philadelphia Electric to build a 220-kv line from Bradford to Chester because it will go through the historic Brandywine battlefield area. New line, according to company, will reinforce service supply in the Chester industrial area, now served from Philadelphia.

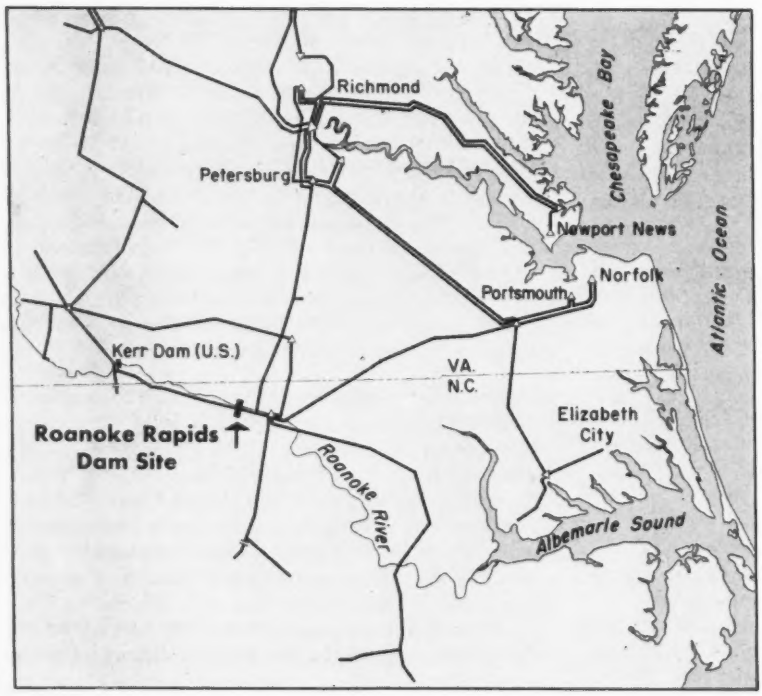
Testifying before Kentucky PSC on East Kentucky Rural Electric Cooperative Corp's plan to build 1,200 miles of 69-kv transmission lines, C. N. Phillips, Ebasco engineer, proposed that Kentucky Utilities, Louisville G&E, Kentucky-West Virginia Power, Union Light H&P and East Kentucky co-op form a transmission pool to wheel power in the East Kentucky area, thus saving co-op members and utilities a substantial amount of money. The Court of Appeals had sent back the case to PSC last November to determine if the lines to be built by the cooperative would be a wasteful duplication of existing facilities.

First unit (156,000 kw) at Electric Energy's Joppa Plant will go on the line within the next few weeks; the first (135,000 kw) at TVA's Shawnee Station in mid-April. The steam stations, on opposite side of Ohio River in Illinois and Kentucky, will supply power for an atomic energy plant at Paducah, Ky.

Congratulations—R. R. Habberly becomes operational vice president for Western Massachusetts Electric . . . Hawaiian Electric names L. W. Lengnick vice president.



Vepco Dam Upheld . . .



. . . for Roanoke Rapids

In a decision that may mark a turning point in federal power policy, the Supreme Court last week reaffirmed the Federal Power Commission license granted Virginia Electric & Power Co to build a 90,000-kw hydro project at Roanoke Rapids in North Carolina.

By implication, the 6-3 decision helps clear the way for private utilities to develop hydroelectric sites on the nation's navigable streams unless Congress has specifically reserved them for government development.

Validation of the FPC license to Vepco was the most dramatic turn in government power policy since the exit from Washington of the New Deal. Still to watch are the policy decisions of President Eisenhower on use of federal money for transmission lines, and for new contracts for sale of government power to customers of private and public systems. In any case, a change in direction is apparent. Only question is how far the Administration will turn.

At least 17 other potential hydroelectric sites in the Roanoke and Savannah River basins are in the same legal posture as Roanoke Rapids. Presumably the Supreme Court action now opens these for licensing to private enterprise unless Congress subsequently withdraws them for federal development.

Vepco had previously applied for a license to develop one of these—the Gaston site on the Roanoke, but FPC has held the application in abeyance pending outcome of the Roanoke Rapids case. The way is now clear to consider Gaston.

The decision may help Pacific Gas & Electric Co, which is in the midst of a similar case over a hydroelectric site on the Kings River in California. How many other sites on which government surveys have been conducted may be indirectly affected by the High Court action, government spokesmen will not venture a guess.

Douglas Dissents

The majority opinion of the Supreme Court in the Roanoke Rapids case assailed Interior Department's contention that FPC had no authority to license the project, and sided with FPC and Vepco on all except one point. Former Interior Secretary Oscar L. Chapman had initiated the case with full backing from President Truman (EW, Oct. 27, p 10).

For dissenting Justice William O. Douglas, however, the question was whether to sanction an "unconscionable appropriation of the public domain by private interests."

Douglas argued for the minority that while Congress had left part of the public domain to be exploited by private interests, its approval of the Roanoke River Basin plan expressly reserved the basin for federal development.

Private power groups at Roanoke Rapids, Douglas asserted, will be appropriating energy worth more than $700,000 a year supplied by a federal reservoir upstream.

From there on, Douglas took over and expanded Interior's argument:

"The master plan now becomes clear: the federal government will put up the auxiliary units— the unprofitable ones; and the private power interests will take the plums—the choice ones." Chief Justice Vinson and Justice Hugo Black joined Douglas in dissent.

Interior, along with the Virginia REA Association, had argued:

1. That Congress had "approved" and "adopted" the general basin development plan for Roanoke River including the 11 hydroelectric sites. This, said the petitioners, meant the sites were withdrawn from FPC licensing authority.

2. That the commission had generally approved the plan for federal development previous to Congressional action on the plan, and thus was precluded from issuing a license.

3. That Interior and the REA Association were "aggrieved parties" with interest sufficient to merit their standing in court. They based this on their potential roles as marketer and customer of power from the dam if it should be built by the federal government.

Frankfurter's Opinion

Justice Felix Frankfurter, writing for the majority, agreed that Interior and the association had a standing in court, but declined to elaborate on the "divergent grounds" accepted by the court in arriving at this conclusion.

In rejecting the other contentions, Frankfurter made these points:

- Congressional approval of a basin plan does not reserve all sites for federal development: "Congressional 'approval' without more, cannot be taken, we think, to indicate in this case more than a legislative finding that the proposed projects, no matter by whom they may be built, are desirable and consistent with Congressional standards for the ordered development of the nation's water resources."
- In subsequent actions, Congress has singled out specific projects in the

(*Continued on page* 121)

CLAUDE WICKARD

ROMEO SHORT

Wickard Quits as REA Head

Long-time chief 'resigns' after learning he could be ousted. Romeo Short is transferred to new post.

Republican "overhaul" of the Agriculture Department hit hard at Rural Electrification Administration last week.

Ousted as administrator was Claude Wickard, in the eighth year of a ten-year term in that job. The long-time chief was allowed to resign after being told that a way had been found to throw him out of the job. He will go back to his Camden, Ind., farm. Wickard's successor was not named immediately.

Short Transferred . . . A step higher, Romeo E. Short, a Republican appointee, was transferred from his position as director of Agriculture Credit Services where he had been in charge of REA and three other agriculture agencies. Short now heads the department's Foreign Agriculture Service.

Into Short's position came career employee R. L. Farrington, who was listed as "acting director." There is a chance that he is serving only until Agriculture Secretary Ezra Taft Benson can make a permanent appointment.

Resignations Expected . . . Deputy REA Administrator William C. Wise and Assistant REA Administrator S. Riggs Sheppard are expected to resign shortly. Both are Wickard appointees, and Sheppard has no civil service standing, which might safeguard his job. Last week Wise was acting as REA administrator.

Mentioned as possible successors to Wickard are Ancher Nelsen, Lieutenant Governor of Minnesota, and W. Gordon Loveless, vice president of the National Rural Electric Cooperative Association. NRECA is the national lobbying and educational association serving REA-financed cooperatives.

The Wickard resignation came on the heels of a White House conference at which President Eisenhower and Congressional leaders had discussed removal of many Democratic appointees from government policy-making jobs.

Sen Robert A. Taft, Senate Republican leader, said the idea was to rid the government of New Deal thinkers.

Served with AAA . . . Wickard, who was born on an Indiana farm in 1893, became REA administrator in 1945. His long association with the Agriculture Department began in the early days of the New Deal. He helped set up the original AAA corn-hog program and became assistant chief of the AAA corn-hog section. In 1935 he was made chief of the section.

When the AAA began its agricultural conservation program in 1936 Wickard became assistant director of the North Central Division and later director. After 6½ years with AAA, he was appointed Under Secretary of Agriculture in February 1940 and later that same year moved up to the post of Secretary, which he held until named to head REA.

No Preference Law Change . . .

. . . will be made this session by Congress. Senate and House spokesmen indicate the issue is too hot, politically

It is becoming clear that Congress intends no basic legislative change in federal power marketing policy during the present session.

This is especially true of the "preference clause" found in the 1944 Flood Control Act and several other laws dealing with the marketing of power from government-owned projects. In general the controversial clause directs that public bodies and cooperatives be given priority in the purchase of electric power from federal projects.

During the 20-year reign of the Democrats, the clause became the keystone to government power policy. Public bodies and cooperatives, where possible, have come to depend on this government source to fill a large part of their energy needs.

There have been occasional signs this year that the "preference clause" and other aspects of the marketing policy might come up for review. Several lawmakers in both the House and Senate have indicated they favor such a review. The new Republican Secretary of Interior, Douglas McKay, has also asked for some legislative clarification of the present power policy.

But the evidence is growing that the review won't come this year:

- With nearly three months of the session behind, not a single bill has been introduced touching on the "preference clause."
- No move has been made toward any definite committee action along this line.
- The few lawmakers who have shown concern over the present marketing policy have been unable to gather much support from their colleagues for a legislative review.
- Tight schedule of "must legislation" put together by the White House and Congressional leaders does not include any changes in power marketing policy.

This, however, does not rule out marketing policy changes that may come about through appropriation legislation or administrative procedures. For instance, deletion of funds for transmission lines could bring about certain changes in marketing policies without the necessity of modifying the basic laws on this policy.

Likewise, stricter administration of the power marketing laws could easily bring about some changes. For instance, Interior Department has wide discretion in determining how far it can or should go in delivering federally produced electric power to preference customers. Some methods used by the Democrats in calculating the economic feasibility of federal transmission lines are not likely to be adopted by the new Republican administration.

But the Republicans want plenty of time to think and study before embarking upon any formal review of the legislatively embossed "preference clause."

Preference Politics . . . One Senator who is not necessarily sold on the fairness of the "preference clause" has said it would be "a mere pipedream" to believe that Congress will undertake to repeal or modify it this year.

A highly placed Congressman, who is convinced of the unfairness of the clause, predicts that any attempt to repeal or modify it would not draw 25 votes in the House, where 218 votes would be required for passage.

Last week two subcommittee chairman of the House Interior and Insular Affairs Committee took the first tentative step toward determining marketing policies of the administration.

Republican Representatives John P. Saylor of Pennsylvania and Norris Poulson of California sent a joint letter to Secretary McKay asking for his interpretation of the "preference clause." They also asked how he intended to carry out the statutory directive of disposing of power "at the lowest possible rates to consumers consistent with sound business principles."

Saylor hinted this may be the first step toward drawing up some legislation which would provide for a modification of the "preference clause." He is not specifically on the record in opposition to the clause, but he reports he is informed of a number of instances where administration of the legislation has caused inequities.

Other members of Saylor's subcommittee have expressed little interest publicly in his move to gain information on marketing policy.

SEN GUY CORDON, anti, found himself disputing with colleague Wayne Morse, pro public power, on the making of policy

Oregon v. Oregon . . . On the Senate side, the two Oregon senators—politically at opposite poles—have engaged in a debate on power marketing policy.

Republican Sen Guy Cordon, ranking member of the Senate Interior and Insular Affairs Committee and Chairman of the Appropriation Subcommittee on the Interior Department had this to say at a committee hearing early this year: "This discussion has done at least one thing, and I am happy to see it. It has indicated the necessity for the Congress to develop and spell out clearly a public power policy.

"Our policy has just growed like topsy, and there are many questions that are presented now that would never be presented if we had a properly spelled out policy that did equity among the American people."

Independent Sen Wayne Morse, who resigned from the Republican Party last year, later answered on the Senate floor. Aligning himself closely with federal power advocates of past Democratic administrations, Morse said: "After endless and weary battles, a national policy was formulated in plainly written laws of Congress that told our people, all agencies of the federal government, and the world, that at last the United States was on its way to preserving its natural resources and water power for the benefit of all the people."

Morse listed these steps in the development of the federal power policy:

1. Decision to install electric generators at federal dams.

2. Adoption of the "preference clause".

He continued:

"The protection of the legitimate rights of the private utilities does not mean an emasculation of the preference clause. It does not mean that the government is to use the taxpayers' money to build the dams and generate the power, and then discriminate in favor of the private utilities. After all, it is the interest of the taxpayers that ought to come first, and the preference clause is included to protect the ownership of the public in publicly generated power."

Bill Supported by PGE Amended by Oregon Unit

Portland General Electric Co's legislative bid to revise the Oregon Hydroelectric Commission law in hopes of winning state sanction for its Deschutes River Pelton project has been watered down in the House Committee of State and Federal Affairs. But as amended the bill still would give PGE a more satisfactory legal climate in which to seek remedy for its predicament.

As it neared the reporting-out step, the bill would provide the right to appeal Hydroelectric Commission decisions to the courts and remove "veto" powers of other commissions—principally the game and fish commissions—over decisions of the hydropower authority. Legislative opinion indicates a split vote in committee and a close but passing vote of the House. It still would have to go to the Senate, but here the eastern and central Oregon members whose home areas favor the Pelton project hold a more secure margin of strength.

Meanwhile, PGE has moved to protect its equity in the company's court fight to reverse a Hydroelectric Commission refusal to grant a construction permit. The company filed an appeal March 11 with the Oregon Supreme Court from a Marion County Circuit Court ruling upholding the commission.

PGE has argued that the commission had wrongfully delegated authority in its action and did not follow proper procedure in conducting a hearing.

Winnipeg Change

Private electric company is taken over by Manitoba Hydro-Electric Board

By act of the Manitoba legislature Winnipeg Electric Co has ceased to be a private company. Its name, power generating, transmission and distribution facilities were taken over by the Manitoba Hydro-Electric Board on Jan. 26.

The transfer was made possible when the majority of Winnipeg Electric's shareholders accepted a government offer of $36.50 per share for their 564,989 common shares. Those who have not yet accepted have been given until April 3 to do so. Any shareholder who has not sold his stock by that time has the right to contest the offer and refer it to the courts. Upon failure to do this outstanding stock will be acquired by the Manitoba board on deposit of $36.50 per share with the National Trust Co.

Began in 1906 . . . Winnipeg Electric began power operations in 1906 when the original firm, Winnipeg Electric Street Railway Co, started receiving power from its new 30,000-hp plant on the Winnipeg River. In 1912 the newly formed City Winnipeg Hydro-Electric System started producing power at a new plant also on the Winnipeg River.

The two systems became competitors but both continued to expand as the need for power in the area increased. By 1947 it became apparent that new sources of power would have to be developed and the question arose as to what agency should develop it. The provincial government appointed a royal commission to study the power situation and make a report.

Referendum Defeated . . . The commission recommended that all power

New Source of Power for City Light

First 90,000-kw generator has gone into operation (note white water at tail race) at Seattle City Light's Ross powerhouse on the Skagit River. With the new unit turning out 80,000 kw when needed, City Light no longer needs 83,500 kw it had been buying from Puget Sound Power & Light Co for the past two years. Two more generators are due to go on the line at Ross Dam later this year.

generating capacity, present and future, be put in the hands of the provincial government. The recommendation was put before the voters in the form of a referendum and was defeated.

The government then turned the matter over to Winnipeg Electric and City Hydro and asked them to work something out. At the same time it created the Manitoba Hydro-Electric Board and authorized it to construct a plant on the Winnipeg River and later another one on the same river between Winnipeg Electric's two big plants.

With three generating authorities operating on the Winnipeg River orderly use of the water became difficult. Winnipeg Electric, which had told a special session of the legislature in 1952 it would need a rate of return of at least 15% to attract new capital, decided to sell out. A deal was worked out between the Manitoba board and the private utility for the sale and in January the legislature authorized the transaction.

BIF Fair Next Month

More than 280 exhibitors will display electrical products at the British Industries Fair, April 27-May 8. Generating equipment, submersible electric pumps, household appliances, electrical equipment for tractors and agricultural machinery, communications and control systems, cables, and electric tools will be on view.

Mark One Billion

Pacific Gas & Electric Co has spent its billionth dollar on postwar expansion.

PG&E Treasurer Kenneth C. Christensen said in the annual report to stockholders that the company has more than doubled its generating capacity since the end of World War II. "By the end of 1955 we will nearly have trebled it," he added.

PG&E will have another half-billion dollars worth of new facilities completed by the end of 1955, he said. The year's earnings rose sharply over 1951, he said.

James B. Black . . .

. . . is named by President Eisenhower as a consultant to his top cold war strategy group

James B. Black, president of Pacific Gas & Electric Co, has been named as a consultant to the National Security Council—President Eisenhower's top cold war strategy group.

The PG&E president is one of seven civilians from business, labor and education recently appointed by the White House to advise the council on certain specialized matters. It was indicated that the advisors will probably be called on separately for advice rather than as a committee.

The Council was created after World War II to coordinate the nation's diplomatic and military foreign policies. By law its members are the President, Vice President, Secretaries of State and Defense, the Mutual Security Director and the chairman of National Security Resources Board.

Black and the other consultants are to come to Washington this month for a short briefing session. After that, the advisers will probably be called on when their specialized knowledge is needed by the council.

The PG&E president picked up his knowledge of power matters during 41 years in the electric utility field. He was appointed president in 1935, serving before that as a vice president of North American Co.

His company in recent years has staged the fastest expansion program of any private utility in the country. At present it is engaged with Bechtel Corp in a study the feasibility of using nuclear power reactor to produce electricity for industrial use.

EEI Expands Atomic Unit; Dixon Named Chairman

Edison Electric Institute has set up a special committee on atomic energy to further industry-wide relations with atomic energy enterprise.

Edgar H. Dixon, president of Middle South Utilities, has been named chairman. Included on the committee are the following utility presidents: J. W. McAfee, North American Co, Union Electric Co, and Electric Energy, Inc; W. L. Cisler, Detroit Edison Co; George Gadsby, Utah Power & Light Co; R. G. Rincliffe, Philadelphia Electric Co; Elmer Lindseth, Cleveland Electric Illuminating Co; H. R. Searing, Consolidated Edison Co of New York; Philip Sporn, American Gas & Electric Co; J. B. Black, Pacific Gas & Electric Co; I. L. Moore, New England Electric System; and C. B. McManus, Southern Co. Alan S. King, executive vice president of Northern States Power Co, is also a member.

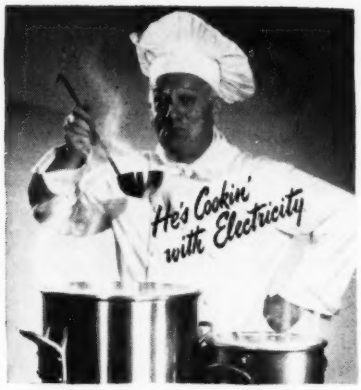
Rhodesia Project to Have 13 Miles of Tunnels

JOHANNESBURG (McGraw-Hill World News)—Plans have been developed by the governments of Northern and Southern Rhodesia to build a 257,000-kw hydro project in the Kafue Gorge of the Zambesi River between the two countries.

The river drops 1,900 ft in 16 miles through this gorge. The plan calls for a storage dam 100 ft high and 600 ft long that will create a 20-mile lake. An intake structure on the right bank will lead to a tunnel cut through 8½ miles of rock to the power station. This first stage will be brought into operation in five years. A second stage, including a five-mile tunnel below the first to a second generating station, will go on the line two years later.

Ontario Plant Back on Line

One week after fire put Ontario Hydro's 200,000-hp Chats Falls plant completely out of service, six of the station's eight units, generating 165,000 hp, were back on the line. Repairs were made at the station on an around-the-clock basis. Fire raged through the plant March 2 after an oil disconnect switch exploded. The plant is controlled and owned jointly by Hydro-Electric Power Commission of Ontario and Ottawa Valley Power Co.



A Neglected Load—

Commercial Electric Cooking

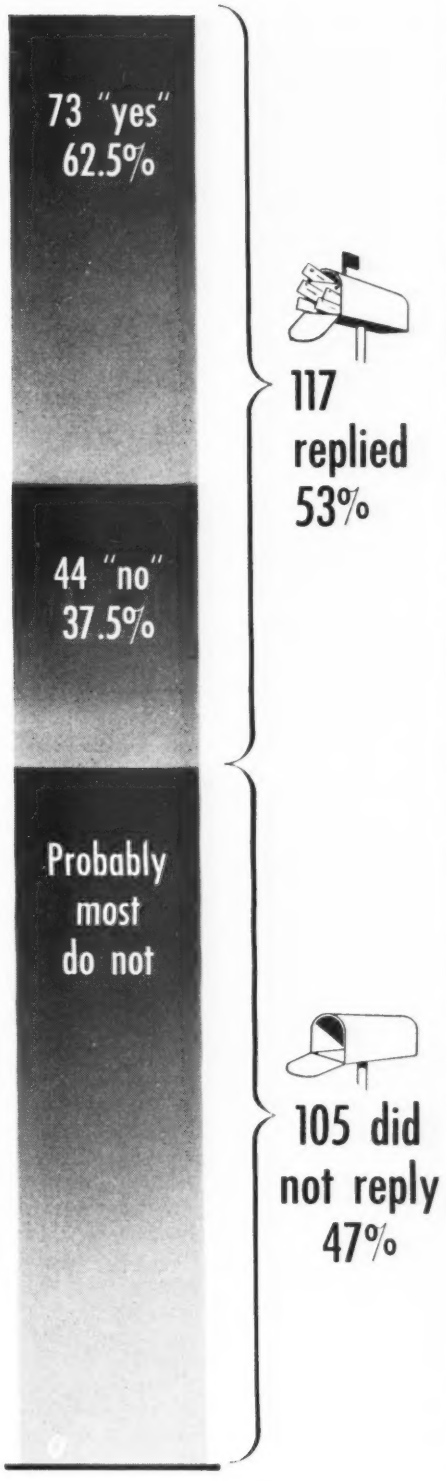
Survey shows its promotion has been ignored though it brings profitable revenue

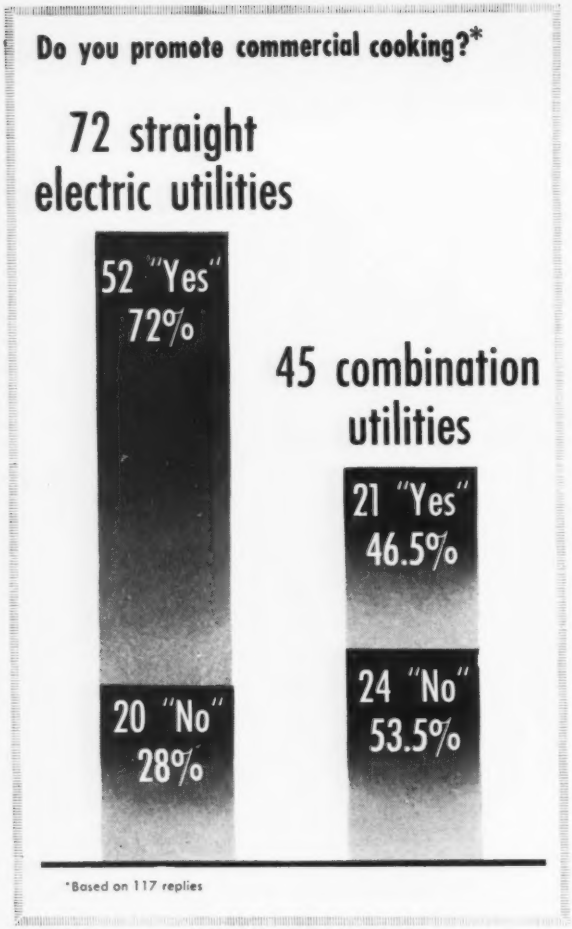
Inescapable conclusion from the commercial cooking survey here reported is that many—probably most—electric utilities are neglecting an important source of profitable revenue. Questionnaires were sent to 222 utilities. Replies were received from 119, two of which were received too late for use in this report. Of these, 73 answered "yes" to the question, "Do you now promote commercial electric cooking?"; 44 answered "no." It must be assumed that the majority of the 105 utilities that did not reply are not particularly concerned about the matter and probably do not promote this use of their service. Thus, it seems clear that the electric utility industry is not giving to commercial cooking the attention it deserves.

The compiled data of this report cover 117 utilities. The replies represent 45 combination gas and electric utilities and 72 straight electric. As was to be expected, commercial cooking is promoted by a larger proportion of straight electric (52 of 72) than by combination utilities (21 of 45). As to future plans, four straight electric and four combination utilities either intend to start promotion soon or are giving consideration to it.

Results from promotion of commercial cooking come fast. Figures presented in more detail later in this report indicate that revenue from this service—actively promoted—can be expected to rise 10 to 14% annually and connected load (much of its demand being off-peak) to go up at about the same rate. This rate of revenue increase is faster than the 8.5% rise in total revenue for the whole industry in 1952 and the 7.5% rise in 1952 in revenue from all commercial and industrial customers.

222 electric utilities were asked if they promote commercial electric cooking





Large Market . . . The potential of the commercial cooking market is big. It includes all non-residential customers who prepare and serve food—not just public eating places, but institutions such as schools, hospitals etc. and industrial plants and other places where food is served to employees. A question in the survey asked how many such customers used electricity only for food service, how many fuel only, and how many both.

Only 36 of the replying utilities furnished information on the three points. They have a total of 80,076 such customers. Less than one-tenth of these customers use electricity, over three-tenths use fuel only, and the rest use both. Of those using both electricity and fuel, the replies indicate that most use electricity only for counter equipment, toasters, coffee makers and the like, leaving to fuel the main production job.

Partial answers to the question came from 60 utilities representing 200,000 or more food service customers. These 60 utilities are among the 73 reporting commercial cooking promotion. It is apparent from the foregoing figures that even for those utilities that go after commercial cooking load, not much more than a start has been made on the market.

Strong Competition . . . Competition against commercial electric cooking is strong. It cannot be sold on the single basis of heat cost comparison. The fuel BTU—piped gas, LP, oil or whatever—just naturally costs less than the electricity BTU. Of the 49 replies that gave heat content of competitive piped gas only eight indicated the competition is manufactured gas. Lumping these with the rest results in an average of 952 BTU per cu ft sold at a rate of $0.84 per 1,000 cu ft. The range of rate is from $0.25 to $3.89. For the same utilities the average rate for electricity is 2.37 per kwhr, the range from one to three cents. These figures show that on the average electricity BTU costs about eight times as much as the piped gas BTU. The replies give LP gas costs averaging $.07 per lb, ranging from $.03 to $.18. These figures show LP averaging about one third the cost of electricity on the simple heat comparison.

Additional to this advantage in absolute heat cost, piped gas competition is pushed by vigorous promotion according to 60 to 71 replies, and LP competition according to 53 replies. That the gas utility merchandises commercial cooking equipment is stated by 40 of 73 replies and services that equipment according to 62 replies.

It is these competitive considerations that cause many electric utilities to give up on commercial electric cooking without even trying. The greatly over-balancing advantages of the electric way in food economy, convenience, cleanliness, safety, employee morale, etc. will not be enlarged upon here, but they do exist.

Second-Class Sales Operation

Though it is risky to make judgements about an individual company's sales operations from its submitted survey, the reports, taken together, show that electric cooking has been playing second fiddle to other commercial activities.

For one thing, only 45 companies reported having commercial cooking specialists. Of these only 32—or 44%—of the promoting companies had full-time men, and only 12 of these had more than one full-timer. Five companies reported two full-timers, four reported three, two reported four, and the other one, seven.

Combination companies showed up particularly well in this respect. Two-thirds—14 out of 21—have specialists, ten with full-timers. Three of these companies reported having three specialists, and one reported two.

Combination utilities also don't burden their full-time specialists with as many commercial customers as do the straight electrics. Of the eight combination utilities which also indicated how many customers they have for each commercial representative, three reported less than 1,000, and only one (of 3,600) was above 1,800. Average was 1,363.

Among the 16 straight electrics, only two had full-time specialists with fewer than a 1,000 customers and six had 1,800 or more, ranging up to 3,500. Average was 1,790.

Sixteen—or 22%—of the promoting companies reported having no full-time commercial representative, and four others reported only one. One company reported 69 full-time commercial men and another 50. Average for the 57 companies with full-time commercial men is 12, with 28 of the companies within five of the average. Nine were above that limit and 20 below.

A hopeful sign is that from among the 28 companies without specialists, 19 have given sales personnel a program or course of commercial cooking training during the past year, and two others expect to do so during the next

year. Among the 45 companies employing specialists, 34 gave commercial cooking sales training in 1952, and nine of the 11 others expect to do so in 1953.

Company Resources . . . In augmenting field operation, only 24—or 33%—of promoting companies maintain a display room for commercial cooking equipment, only four of which are combination companies. Five more combination companies and 18 straight electric, however, do have facilities on utility premises for equipment demonstration.

While no question was asked to cover the extent to which utilities map out market helps for its representatives, a number of companies submitted materials to show something is being done along this line.

Among companies which produce full-blown year-long plan books for cooking sales are Kansas Gas & Electric Co, Southwestern Gas & Electric Co, Pennsylvania Power & Light Co, and Union Electric Co of Missouri.

Typical is the one of Southwestern Gas, which during 1953 will:

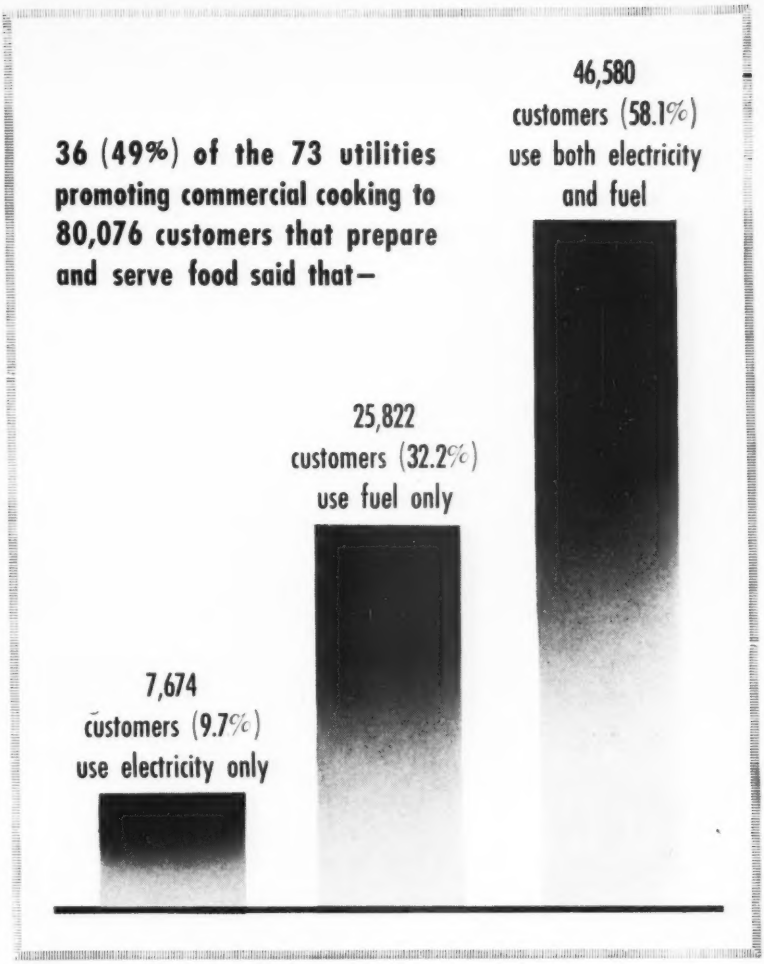
- Expand its fry kettle promotion.
- Increase number of mailings of "Food Service."
- Make more food service operator contacts.
- Distribute more sales promotional literature.
- Display more commercial cooking equipment.
- Prepare more information about what has been sold.

Promotional Helps . . . In their calls on commercial customers, utility representatives use many cooking sales aids, in varying degrees of emphasis.

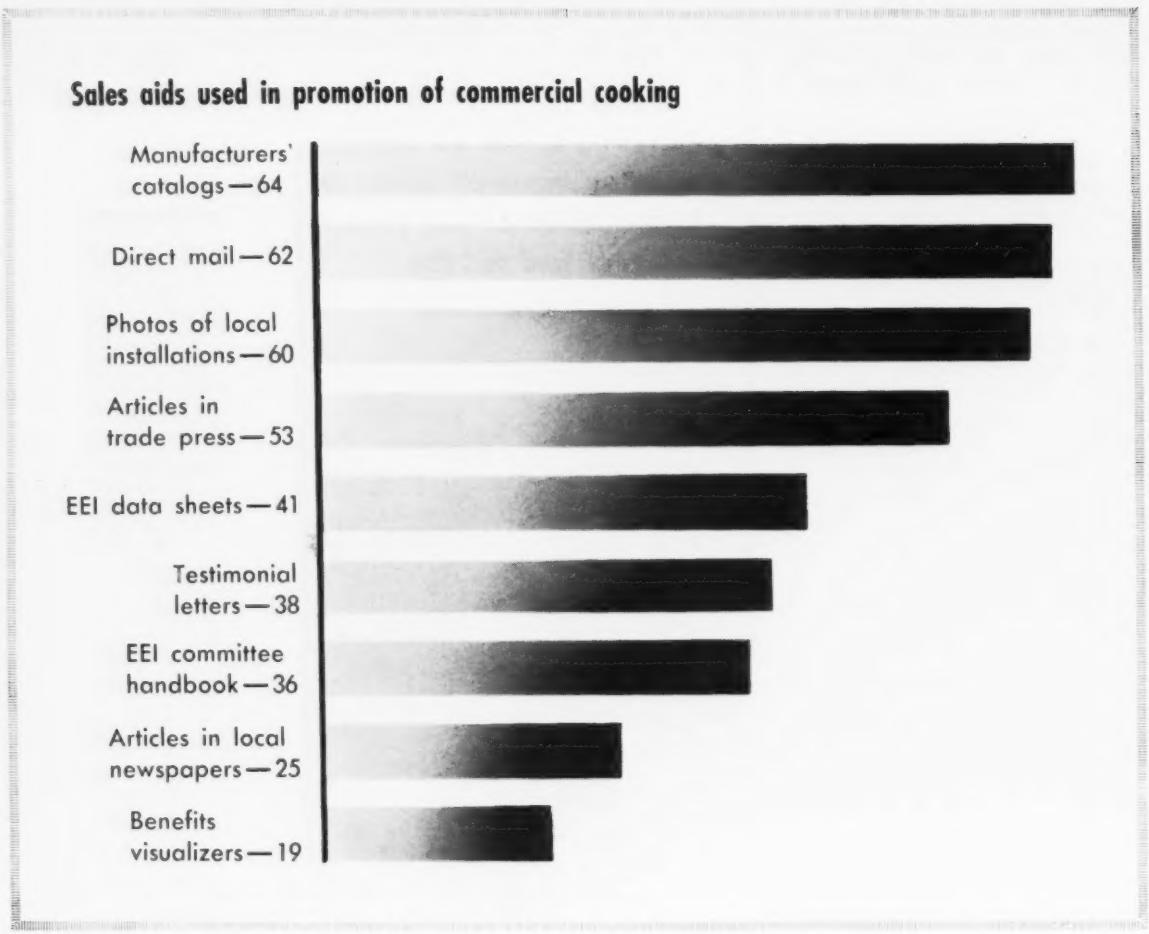
Among the promoting companies, most frequently used device is manufacturers' catalogs. Sixty-four utilities—or 88%—reported having them. Other devices and the numbers of promoting companies that use them:

- Direct mail pieces: 62
- Photographs of local installations: 60
- Articles from trade press: 53
- E.E.I. data sheets (case studies of big installations): 41
- Testimonial letters: 38
- E.E.I. cooking committee handbook: 36
- Articles in local newspapers: 25
- Benefits visualizers: 19

Five companies use none of these materials, one singled out one, and


36 (49%) of the 73 utilities promoting commercial cooking to 80,076 customers that prepare and serve food said that—
7,674 customers (9.7%) use electricity only
25,822 customers (32.2%) use fuel only
46,580 customers (58.1%) use both electricity and fuel

Complete electric cooking should be the aim



two are using two of them. Only four companies use all nine of these materials, and two prepare still other materials. Fourteen companies use eight, six use seven, nine use six, 14 use five, 11 use four, and seven use three. Most prominent among other devices employed are electric cooking trailers (named by five companies), Electrical Information Publications and manufacturers' handouts (named by three), and perspective drawings and slide films (named by two each).

Mailings Numerous . . . Supplementing the personal approach are mailings of promotional material to selected lists of prospects. Only six companies do not make such mailings, three of them being among the five who use none of the sales aids mentioned above.

More than a third of the 67 companies using mailing pieces—24—send them on a monthly basis. Five use mailings every two months, four on a quarterly basis, and three semi-annually. The other 31 send materials via mail on an irregular time schedule.

This is not taking into account mailings of "Food Service," national publication for the commercial cooking industry. Sixty-five of the 73 promoters purchase subscriptions to the magazine for distribution among commercial establishments. Sixty-two companies indicated how many were used. The average was 875, for a total of slightly more than 54,000.

Though utilities use the mails heavily in cooking promotion not many of them produce their own mailing pieces. Only 23—or 31½%—do so, while 53—or 73%—dispense mailing pieces supplied by manufacturers.

Among utilities that made available samples of mailing pieces produced in home offices are Atlantic City Electric Co, West Penn Power Co, Ohio Power Co, Pennsylvania Power & Light Co, and Hartford Electric Light Co.

Most of these described outstanding electric cooking installations, or advertised free trial use offer of particular pieces of equipment. Two of the companies—West Penn and Hartford Electric—sent along samples of publications produced especially for persons connected with electric cooking or baking. Hartford publishes a monthly "Electric News for Chef and Baker," while West Penn publishes a monthly "School Lunch News," which brings news of electric cooking to administrators and directors of schools with student lunch programs.

Other Failings . . . There are other indications that some utilities reporting commercial cooking promotion are not doing a wholly effective job. Such an indication is provided by answers to the question: "Do you have a planned pro-

Here are a few mailing pieces produced by utilities that give promotion a definite local pattern

gram of commercial cooking sales. . . . on specific equipment in particular months. . . . 'Roundups'. . . . Contests. . . . Other?"

More than one-third (27 out of 73) of the companies with cooking programs did not list any planned promotional activity. Furthermore, of those answering affirmately, 11 companies (about 24%) noted only one special program. In seven cases it was some form of cooking or baking "roundup;" in three a periodic campaign; and, in the other, a contest.

Fourteen others listed only one of the three specified types of endeavors, plus another effort not covered by the question. Altogether, 21 listed two kinds of activities, and 13 three different ones. Of the latter, only six carried on all promotions covered by the question, and half of these carried on still other activities.

Indicating that there is a correlation between promotion and sales success, the six included Appalachian Electric Co, Duquesne Light Co, Atlantic City Electric Co, and New England Power Service Co, four cooking promotion leaders.

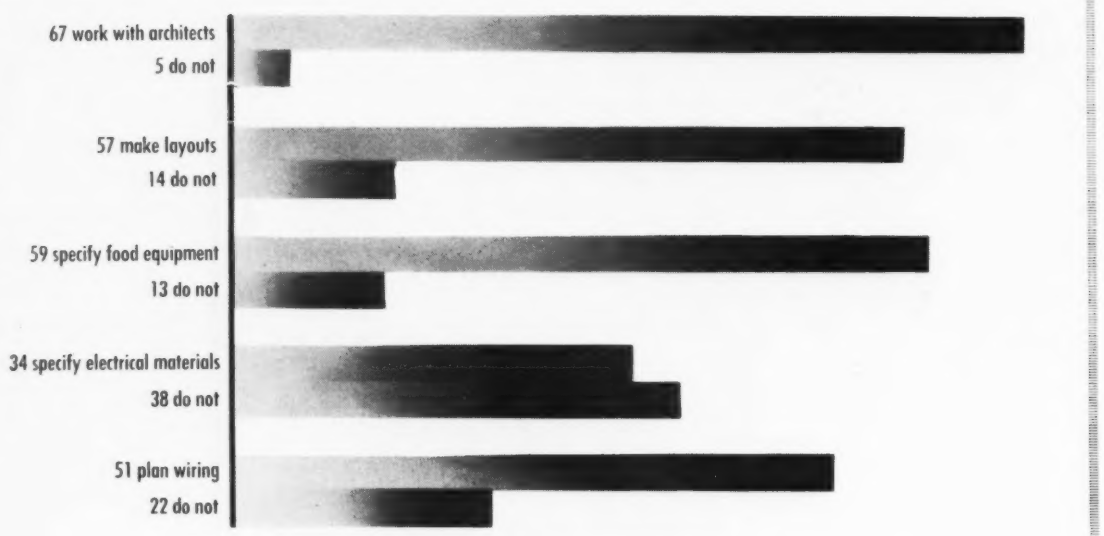
Typical of several comprehensive year-long sales planning programs is the one conducted by Pennsylvania Power & Light Co. In includes one roundup for restaurateurs, school authorities, and in-plant feeding personnel, two divisional commercial equipment shows, six neighborhood cooking shows, four in-plant feeding demonstrations, and 24 displays of equipment in company stores.

Among individual undertakings are school cafeteria workshops conducted by Kentucky & West Virginia Electric Co at which cafeteria personnel receive instructions in menu planning and operation of electric equipment; Toledo Edison Co's 90-day trailer campaign with special financing by the utility; Western Massachusetts Electric Co's clinic for school principals, superintendents and committeemen; and selling contests among salesmen, such as Metropolitan Edison Co's bonus plan during a 60-day selling campaign and West Penn Power Co's year-round competition among individual salesmen based on total cooking load.

Periodic Drives . . . Twenty-two companies reported some sales activity on specific equipment in particular months, or other short-term sales programs. Typical of the latter was a three-month drive undertaken by Duquesne Light Co during the first half year of 1952, which resulted in 1121 sales of commercial cooking equipment, for a grand total of 5,795 kw. Estimated annual revenue from new installations was $127,490.

To accomplish this Duquesne sales representatives fol-

Selling commercial cooking gets some extras from utilities



lowed a 6-point plan mapped out sometime beforehand.

- Each territory was thoroughly analyzed and quotas assigned from revised information and statistics obtained from its "Customer Record System."
- Sales contacts were concentrated among food service accounts. Calls on food service customers totalled 3,886, or 56.2% of calls made in the period.
- 89 free trial demonstrations were made of any one or more of six counter appliances.
- Direct mail and sales personnel stressed importance of "Planned Electric Kitchens." Ten all-electric layouts were prepared by the department, excluding those made by equipment dealers.
- Ten mailings were made to the food service list of 6,000, for a total of 60,000 pieces.
- An incentive plan was put into effect for sales personnel during the three-month stretch.

Roundups Plentiful . . . Almost half of the companies—34—with commercial cooking programs conduct one or another of so-called "roundups."

At its most elaborate, such a function takes on the form of the program put on last summer by the Union Electric Co of Missouri. On three successive nights factory operators and personnel directors, school officials and lunch program directors, and restaurant owners and managers, respectively, attended: (1) a factory feeding forum; (2) a school feeding clinic; (3) a "Restaurant Idea Round-Up."

Altogether, 1,200 factory, school, and restaurant people heard experts in their respective fields told of their experiences in planning, building and operating all-electric commercial kitchens. Supplementing the spoken "pitch," were slide and motion films showing installations of all kinds.

Most popular form of round-up is the one aimed at restaurant operators. Among utilities which indicated carrying on such a promotion were Utah Power & Light Co, Atlantic City Electric Co, Ohio Power Co, Pennsylvania Power & Light Co, and Texas Power & Light Co, which is planning 10 such roundups during the year.

How such a program can be exploited is demonstrated by the practice of Union Electric Co, which is holding restaurant roundups in seven towns in its service area between this month and the end of May. For ten days after each session the utility's commercial representatives in the towns affected, with aid from the electric cooking specialist, follow up on those customers who attended a roundup. They take along a trailer purchased from a prominent equipment manufacturer on which are displayed many of the kinds of equipment available.

Contests Also Popular . . . Fifteen of the companies also use contests to promote cooking equipment sales. While not all companies indicated what shape such contests take, none of those which did amplify their answers mentioned anything but a contest among salesmen.

Most elaborate of the contest forms indicated by materials other than the bare survey sheet is Pennsylvania Power & Light Co's "Commercial All-Electric Kitchen Club."

To gain entry commercial representatives must earn ten points, on the basis of kw load sold for all-electric installations. The representative receives 50 cents a point after attaining club membership and sales supervisors receive one-quarter of point value accrued by representatives.

Methods Vary . . . As for individual sales practices, the following information was elicited from survey answers:

- 53—or 74%—of the promoters organize and sponsor special meetings for food service operators.
- 47—or 64%—make trial installations, with counter equipment of various types used most frequently. Twenty-nine companies listed this general heading, with heavy duty equipment following with six mentions. As for single devices, the oldtimer among electrical cooking devices, the fry kettle, received most mentions—17. The griddle-grill was mentioned by six companies, and the food warmer by four. Others include the coffeemaker, dutch oven, broiler, urn heater, waffle baker, hotplate and toaster.
- 67—or 92%—work with architects in design of food service premises.
- 61—or 83%—make layouts of equipment for prospects.
- 59—or 81%—specify equipment.
- 51—or 70%—plan the wiring.
- 34—46½%—specify electrical materials.
- 18—or 24½%—assist in financing purchase of cooking equipment.
- 6—or 8%—subsidize wiring for cooking installations, on a weighted average of about $5 per kw.

Cooperation on Local Level

Those utilities active in commercial cooking promotion are generally making some effort to cooperate with local business interests in the electric field: dealers, service companies, electrical contractors, architects, and the like.

Of the 73 promoting stalwarts, 65—or 89%—replied that they were working with local groups in some way, with 38—or 52½%—holding memberships in restaurant associations and participating in their local activities.

Most common form of cooperation are utility exhibits in local shows of food service equipment. Forty-five—or 62%—of the promoting companies carry on such work.

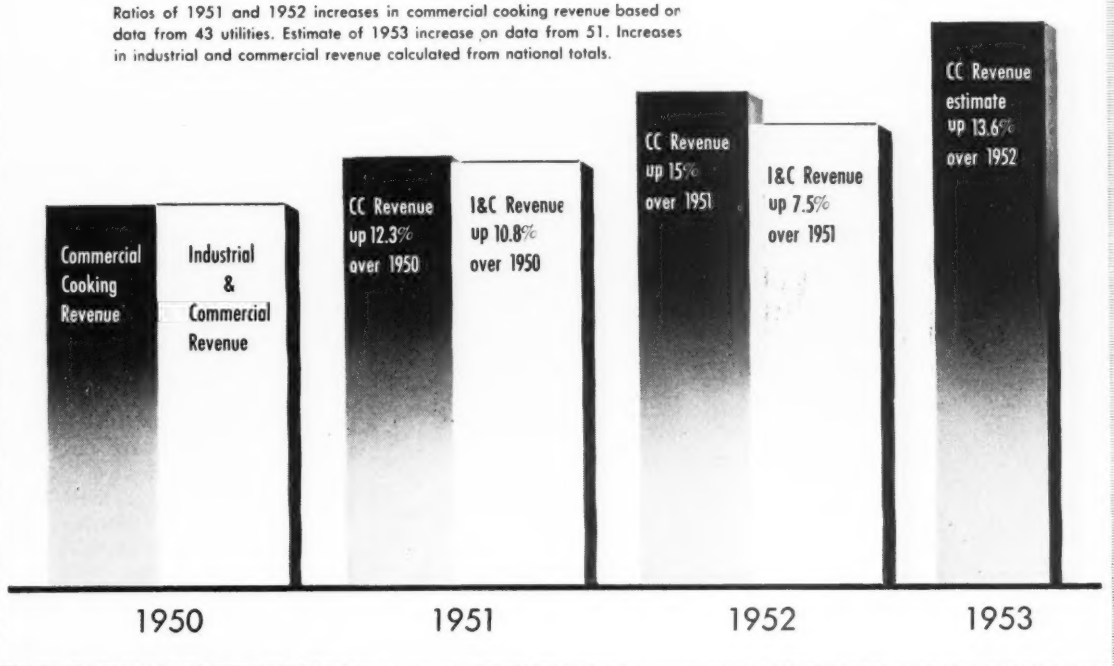
Next in line—with 56%—are efforts to educate or train dealers' salesmen. Most prevelant practices in this direction are special sales training schools and meetings for dealer salesmen; inviting them to training sessions for utility representatives; supplying them with literature illustrating advantages of electric cooking; sales and service clinics; on-the-job-customer calls with dealer representatives; and assisting distributors and manufacturers in setting up training programs.

Of the 41 companies answering "yes" to this question, 28 stated that some sales training program for dealer sales personnel was carried on on a regular basis. But what sales aids—in the form of literature—these sales people receive from utilities is difficult to determine. It must be assumed that practically all of such material supplied to dealers is that made available by manufacturers of cooking equipment. Respondents to the survey were asked to send along any pertinent exhibits of promotional material, but not samples of pieces available from manufacturers or other industry sources. In the considerable quantity of such material received there were no samples of sales helps offered by utilities.

Another utility service provided dealers is making an addressograph available for dealer mailings. Only 18—

Commercial cooking revenue rises faster than total industrial and commercial revenue

Ratios of 1951 and 1952 increases in commercial cooking revenue based on data from 43 utilities. Estimate of 1953 increase on data from 51. Increases in industrial and commercial revenue calculated from national totals.



24%—of the utilities provide such a service. Three more utilities stated they would willingly provide the machine, if asked, which points up the fact that there is no way of knowing how prevelant the practice would be if more requests were made for such service.

Only five companies affirmed that they assisted dealers financially, and in all instances such help took on a different form. One mentioned sharing cost of radio advertising and another prepares direct mail pieces for dealers. Another utility turns its sales over to the dealers, one provides an installation subsidy, and the last helps underwrite expenses of special dealer selling campaigns.

What utilities are doing about servicing commercial cooking equipment is difficult to measure with figures. "Yes" or "no" answers give no hint of how thorough a job is being done.

However, survey replies show that 46—or 63%—of the 73 promoting companies service such equipment. Of these 36 (25 straight electric and 11 combination utilities) do such work exclusively in their service areas. Of the remaining ten, half receive some help from either a dealer, service company, or electrical contractor. The other five use the services of two of these.

In nine—or one third—of the 27 instances in which utilities do not service, dealers do the work themselves. In six other cases the service company does the work exclusively and in two cases the electrical contractor.

In six other instances the work is done by two of these agencies, and in the remaining four by all these working together. Altogether, the dealer plays a hand in the servicing 23 times, the electrical contractor 20 times, and the service company 15.

Of the 46 utilities doing service work, 33—or 72%—maintain a stock of replacement parts, while 37—or 80%—either have on hand or have access to "loaners" for replacement of customers' equipment temporarily out of order.

However, only one-third as many—13—carry on a regular program of inspection and maintenance of customers' equipment.

Here's the Pay-Off

Commercial cooking is by no means a newcomer on the scene of electric utility service. Utah Power & Light Co and Washington Water Power Co have been promoting it for 30 years. Another has been at it for 28 years, two for 26 years, nine for 25 years, and many more for 15 to 20 years. In the 70 replies reporting on this point there are five that say promotion has been going on for only one year.

Present connected load reported by 54 utilities totals 1,106,678 kw. Only 43 of the 54 furnished data showing estimated connected loads for the consecutive years 1950 to 1953. The totals of these—777,626 kw, 871,233 kw, 998,792 kw, and 1,140,988 kw—appear in an accompanying graph. The rate of growth shown—12 to 15% annually—proves the responsiveness of this service to aggressive promotion.

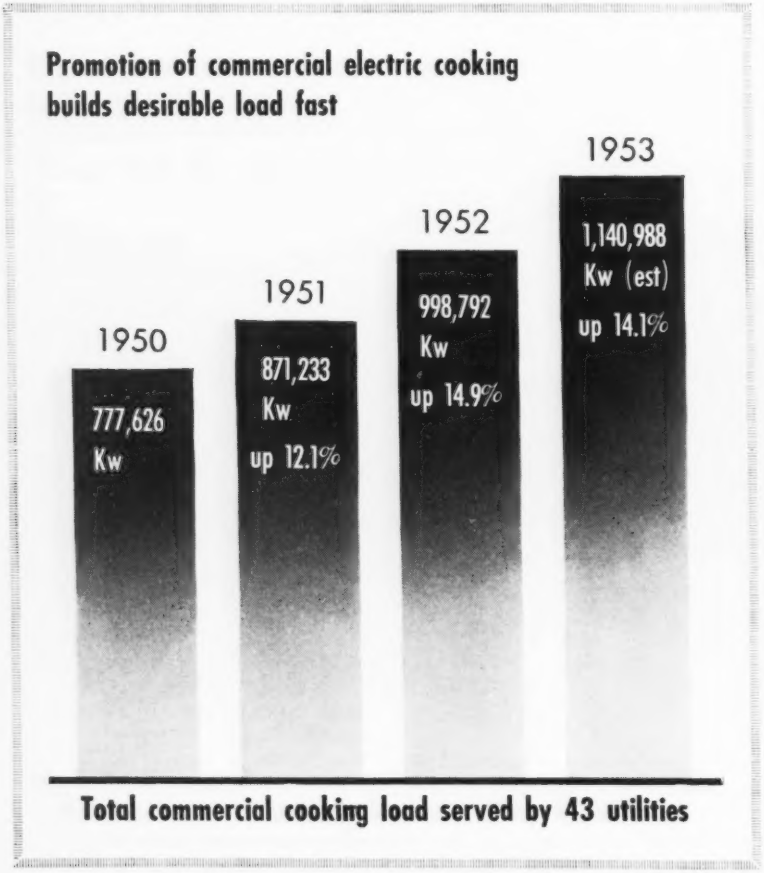
Another graph shows the rate of revenue increase to be equally fast. Revenue totals for the same 43 utilities were approximately $16,650,000 in 1950, $18,450,000 in 1951, $19,830,000 in 1952, and an estimated $22,560,000 in 1953. These figures indicate over $20 annual revenue per kw for connected load.

Taking demand and coincidence factors into account, it is reasonable to assume a revenue of at least $60 per kw of diversified demand at time of commercial cooking load peak. Considering that this peak does not coincide with system peak, one is justified in assuming that the revenue per kw at time of system peak is considerably more than $60.

Figures on EAR per kw of new load added were given in 56 replies. The average of all is $25.72. The range is from $12.50 to $60. Five replies stated $40 or more; 10 stated $30 to $40; 31 stated $20 to $30; and 10 below $20.

Replies in respect to EAR per dollar of sales expense were fewer—only 27. Average was $14.44 and the range is from the Doherty classic of $1 to $98. This extreme range is undoubtedly due largely to differences in sales expense accounting. EAR of less than $6 was reported in 17 replies. Overall this represents sales success that ought not be ignored by utilities.

(*See page 226 for acknowledgment*)



Vepco Dam Upheld

(*Continued from page* 109)

Roanoke Basin Plan and specifically authorized appropriations for them. "When Congress has wished to reserve particlar sites for public construction, it has chosen to say so."

• Both FPC and the Army Corps of Engineers, which are directly responsible for administering water power legislation, had interpreted the 1944 Flood Control Act covering the Roanoke basin development as not reserving the site for federal development. "We find no solid ground for concluding that Congress has taken over the entire river basin for public development with such definiteness and finality so as to warrant us in holding that Congress has withdrawn . . . its general grant of continuing authority to the FPC to act as the responsible agent in exercising the licensing powers of Congress.

• Our conclusion is in accord with the implications of the manifest reluctance of Congress to enter upon power projects having no flood control or navigational benefits."

• "It is not clear that the commission's concurrence in the general plan (previous to Congressional action) would have been much more than simple approval of the location of the dams, the purposes they would serve, and the engineering characteristics of the projects, even if the report had clearly recommended public construction . . . Petitioners in effect ask us to tell the commission what it thought—to say to the commission that it was its judgment that Roanoke Rapids . . . should be built by the government."

• "Of course it is not for us to intimate a preference between private or public construction at the site . . . We are simple asked to decide whether Congress has withdrawn the power to decide this question from the commission. To conclude that Congress has done so by approving a general plan for development . . . would be to contract, by a tenuous chain of inferences, the broad standing power of the commission."

• "We simply decide that the jurisdiction of the Federal Power Commission to issue licenses for private construction of hydroelectric projects in the public interest has not been withdrawn by Congress as to the Roanoke Rapids site."

Justice Tom C. Clark concurred with the majority, but said the administrative interpretations of the FPC and the Army Corps of Engineers with regard to the Flood Control Act "seems to me decisive."

"I would," he wrote, "affirm on the basis of this administrative interpretation by two agencies charged by Congress with direct flood control and power licensing responsibilities.."

Fits Eisenhower's Policy

Outcome of the case, which has been bogged down nearly 4½ years in commission and court procedure, had another aspect which neither the majority nor minority opinion even hinted at. The decision is right down the line with the power policy thus far enunciated by the Eisenhower Administration.

Earlier this month Interior Secretary Douglas McKay indicated to a group of North Carolinians that the case would have never been brought to court if he had been Secretary at the time.

Vepco filed its application for the Roanoke Rapids license Oct. 6, 1948. Hearings were held in May and June of 1949, and FPC issued the license Jan. 26, 1951. Interior and the REA association took the case to a Federal Court of Appeals, which upheld the FPC in a decision handed down Oct. 1, 1951. (EW, Oct 15, 1951, p 5) Arguments before the Supreme Court took place in late October of last year.

Kite Trouble

Seattle City Light line service men have performed this little chore—disengaging a kite from power distribution lines—more than 100 times already this season. Line patrolmen keep an eye on the high-voltage lines and call in for a service man when they see a kite aloft where it shouldn't be. Kites also are taken from secondary lines, although usually not so quickly as from a high-voltage line.

POWER BRIEFS

• Detroit Edison Co is negotiating for the purchase of 1,200 acres of land fronting on Lake Erie near Monroe, Mich. The land is being sought as a site for a coal-burning steam plant.

• Blue Grass Rural Electric Cooperative, Madison County, Ky., has complained to the Public Service Commission that Berea College Electric Power Co is infringing on its territory. The dispute between the co-op and the college-owned utility involves an underground line Berea College installed to serve a service station. After the line was constructed Berea Realty Co asked the college for power to serve a subdivision across the road from the service station. The co-op contends that if the application is granted the college power company will be taking its customers.

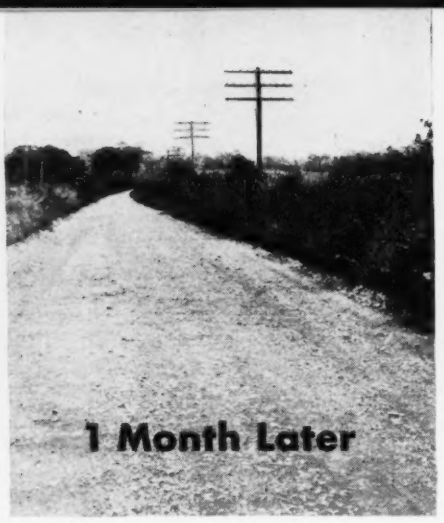
• Both 22,500-kw units at Georgia Power Co's Sinclair Dam are now in operation. The first unit went on the line Feb. 7 and the second Feb. 17.

• Commonwealth Edison Co will install a 191,000-kw unit at its State Line Station. The new unit is scheduled for operation in 1955 and will be the second largest on the Commonwealth Edison system. The largest is a 205,000-kw unit at State Line.

• Central Illinois Light Co has completed installation of 23 mobile two-way radio units in its truck fleet.

• Thomas Alva Edison Foundation and Jules Levey, New York and Hollywood film producer, have announced plans to film the life story of Thomas A. Edison. The movie will depict the inventor's career on the actual locations where he carried on his work. It will be produced for showing in theatres, on television, in schools, and before clubs and civic groups.

• An American engineer, Chester P. Nielsen, is in Venezuela to make the initial studies leading to the installation of five power plants by the government. He is working with the Stubbins Technical Office of Caracas. A 2,500-kw diesel plant will be installed at Barquisimeto and other plants constructed at Cumaná, two in Puerto Ordaz, and one for the Orinoco Mining Co.



Southern Bell Switches to

If properly planned and executed, chemical control costs less in time and money and does a better job.

STEPHEN G. PUGH, Southern Bell Telephone & Telegraph Co

On the basis of four years experience, we believe chemical brush control offers greater opportunity for savings in the cost of right-of-way maintenance than any method of brush control now in use. It does, however, require larger maintenance budgets during the conversion period because the normal cutting cycle is reduced in order to apply the chemical at the optimum growth stage.

Chemical brush control must be carefully planned, scheduled, and supervised if the desired results are to be achieved. It is not a one-shot, cure-all treatment, but a planned series of sprays to bring the woody brush under control and to maintain the control once it is established. If it is improperly used, chemical brush control can adversely affect public relations.

In order to provide the maximum benefit, chemicals used in brush control work should have the following characteristics:

1. Cost of the chemical and application should compare favorably with the cost of hand cutting.
2. The chemical should diffuse or translocate within the plant, killing the root system as well as the stems and leaves.
3. Chemical must not be poisonous to humans or wild life.
4. The chemical should not kill grasses or sterilize the soil.
5. The chemical should not present an undue hazard to crops nor produce a fire hazard.
6. The chemical should not be harmful to equipment or to utility plant.

Many chemicals can be eliminated by applying these characteristics. For example, sodium chlorate presents a very real fire hazard; materials impregnated with this chemical have been known to burst into flame with explosive violence. Arsenic is dangerous to all forms of animal life. Oils, salts, and borax sterilize the soil. At present, our company has settled on two chemicals: 2, 4-Dichlorophenoxyacetic Acid and its derivatives, and Ammonium Sulfamate. Three methods of application are used:

1. Foliage application or complete wetting of foliage and stems of brush during the growing season. The smaller the brush, the easier it is to get complete coverage, the quicker the right-of-way can be covered, and the less chemical is required to give the desired results; hence, the more effective and economical the kill. Spraying of foliage can start approximately 30 days after bud break in the spring and can go until 20 days before frost.

2. Basal application or the complete coverage of the bark area from the root crown of the plant up the trunk or stem 18 to 24 in. depending on the size of the brush. Basal spraying may be applied at any time. If any portion of the perimeter of the stem is not completely wet with the spray solution, the plant will not be killed.

3. Stump application or the complete coverage of the bark area, outer ring of wood, and the root crown of stumps immediately after they are cut. This method is effective on new rights-of-way upon which the brush and debris is generally removed to facilitate stringing wire. If used on stumps resulting from recutting, the brush must be moved so as to uncover the stumps to be sprayed.

Four Years Use of . . . Chemical brush control has emphasized two important facts. Each specie of plant reacts differently to each herbicide, and thorough application is essential.

The standard chemical used in our spray program has been a low-voltatile 50-50 mixture of "D" and "T" containing 4 pounds acid equivalent per gallon of concentrate (2 lbs "D" and 2 lbs "T"). This chemical is satisfactory for use as a foliage application, as a basal application (summer or winter), or for stump application.

As a foliage spray it is mixed with water at the rate of one gallon of the 50-50 chemical concentrate to 100 gal of water and applied to 4 ft-6 ft brush, about 200 gal/acre. Mixture is generally effective on all woody plants

Adapted from recent Southeastern Electric exchange Paper

Chemical Brush Control

except the scrub oak group, hickories, ash, maple, red bud and persimmon.

As a basal or stump application, it is mixed with oil at the rate of 4 gal of the 50-50 chemical concentrate to 100 gal of No. 2 fuel oil and applied at the rate of 80-100 gal per acre for basal application and 20-40 gal per acre for stump application. It is generally effective on all woody plants except persimmon.

The most effective chemical for stump application is a mixture of straight "T" (4 lb acid equivalent per gal in oil). Stump application is generally applied with five-gallon, knapsack-type sprayers, and the mixture used by the telephone company for this treatment is one quart of "T" to 5 gal of No. 2 fuel oil. The rate of application is approximately 20-40 gal per acre of stumps.

New Mixtures . . . Several other mixtures have been tried this year. One mixture which seems to give equal results with the 50-50 mixture of "D" and "T" in water as a foliage application is a two part "D" to one part "T" mixture containing 4 lb acid equivalent. This chemical is mixed at the rate of one gal of the two-to-one mixture of chemical concentrate to 100 gal of water and applied as a foliage spray. The cost of this chemical is about 63¢ less per gal of concentrate than the 50-50 mixture.

This chemical has also been tried as a 5% oil emulsion with promising results, the mixture being one gal of the two-to-one chemical concentrate, 5 gal of No. 2 fuel oil, and 94 gal of water. Present indications are that such a mixture increases the percentage of kill on the resistant species considerably.

One of the most promising chemicals for foliage and basal application summer or dormant is an experimental one by the American Chemical Paint Co, known as "LFN 977 Experimental." It consists of two parts "D" and one part "T" low-volatile ester, 2 lb acid equivalent per gallon, and is applied as a foliage spray or summer basal application as a 10% oil emulsion by mixing 1½ gal of 977 concentrate, 10 gal No. 2 fuel oil, and 88½ gal of water.

For dormant basal application it is mixed at the rate of 4-6 gal of concentrate, 20-40 gal of No. 2 fuel oil, and 56-76 gal of water. Indications are that this chemical combines the advantages of both the water and oil applications to increase the percentage of kill on resistant species. Rates of application are approximately 150-175 gal per acre for foliage and 100-125 gal for dormant basal application.

Ammate is used primarily in those areas where exposure to crop damage is too great to permit the use of "D" and "T". At the present time very little ammate has been applied because emphasis has been placed on those lines located in non-agricultural areas or areas containing few susceptible crops.

Ammate is mixed at the rate of 75-100 lb per 100 gal of water and applied at the rate of approximately 400-450 gal per acre for brush 4 to 6 ft high. To be effective a wetting agent or a sticker-spreader must be added to each mixture.

Generally, two spray applications are required to accomplish the first phase of the chemical program. Two sprays are required because the operators will inevitably miss some of the plants entirely or fail to get complete coverage of the plant.

Cost and Results . . . Effectiveness is based on stem counts of sample plots of approximately 1/10 acres selected at random. Care must be exercised to insure that sufficient sample plots are counted and that the plots selected are representative of the line as a whole. Evaluation of our work to date indicates a 90% ground-line stem kill with 75-80% root kill. For evaluation purposes a 60% root kill is the minimum kill acceptable.

Results of program . . . Approximately 16,000 acres of brush have been sprayed to date this year for an average cost of $34.83 per acre. During this same period approximately 6,600 acres of brush were hand-cut for an average cost of $36.34 per acre.

One of the most interesting comparisons developed from our cost and volume analyses have been the contrast between the average number of manhours required per acre of brush hand-cut and per acre of brush sprayed. For hand-cutting brush to date, an everage of 22.4 manhours per acre were required as compared with an average of 6.3 manhours per acre to spray brush. At present, the cost of chemicals represent 42.9% of the total cost per acre.

Too secret to photograph...

Too big to believe!

America's newest atomic project is being rushed to completion in Pike County, Ohio.

Details are secret, of course. But this much is known: the Atomic project will be the biggest single electric power endeavor in history.

Two of the largest electric power plants in the world will supply the needed power. Together they will generate more electricity than New York City uses . . . nearly as much as all the people and industries in Ohio now use.

To speed America's defense, they are being built fast. From the construction workers to the equipment manufacturers, everyone is geared to record-breaking performance.

These are impressive facts, but even this fact...

The two big coal-burning electric plants were conceived, designed and are being built by a group of neighboring electric light and power companies. Fifteen* of them have joined together to form the $400 million Ohio Valley Electric Corporation to finance and operate this huge power project.

This means quick action for the Atomic Energy Commission. For the companies will supply urgently needed power for construction from their own systems . . . even before the new electric plants are completed. It also means that a large reserve of electric power will always be available.

Here's further proof that the very biggest electric power jobs can be handled quickly and efficiently by America's Electric Light and Power Companies. For if one company alone can't do it, several together can – and will!

*The 15 companies which have formed the Ohio Valley Electric Corporation headed by Philip Sporn, president of American Gas and Electric Company.

Ambachian Electric Power Company, The Cincinnati Gas & Electric Company, Columbus and Southern Ohio Electric Company, The Dayton Power and Light Company, Indiana & Michigan Electric Company, Kentucky Utilities Company, Louisville Gas and Electric Company, Monongahela Power Company, Ohio Edison Company, The Ohio Power Company, Pennsylvania Power Company, The Potomac Edison Company, Southern Indiana Gas and Electric Company, The Toledo Edison Company, West Penn Power Company.

SELECT CAREERS AHEAD — ASK NOW — Friday — 8:30 P.M. EST

YOU ARE THERE — CBS NEWSCAST — ATOMIC ENERGY PLANT SCOOP

Ovec Plants Are Not Blacked Out

Behind the black rectangle above is the picture of the Atomic Energy Commission's project now being erected in Pike County, Ohio. Pictures of such projects cannot be published nor can the details of such plants be printed. But it can be told that 15 investor-owned electric companies have banded together in the Ohio Valley Electric Corp to build two large generating stations to supply electric power for this project.

That is what the Electric Companies Advertising Program is saying in this advertisement which appeared in the March 14 issue of "Colliers." It will appear in "The Saturday Evening Post" on March 28 and in "Look" on April 7. A number of other magazines will also carry the ad.

Annual Reports Comments

Consolidated Gas, Electric Light & Power Co of Baltimore—Under "Unfinished Business" report states: "Because we believe that the creeping inroads of socialism will surely bring a lower standard of living . . . many of the business activities in which our federal government is already engaged —banking, electric power, fertilizer, transportation, insurance, etc—should be discontinued or turned back to private enterprise, and we should urge our representatives in Congress to see that it is done."

Cincinnati Gas & Electric Co—First to come across the desk, this 12-page report in black and white has no illustrations, but good typography.

Detroit Edison Co—The centerspread is a pictorial report of the company's construction program.

17 Companies Are Given Management Awards

Seventeen electric companies have been awarded Certificates of Management Excellence for 1952 from the American Institute of Management.

Eight companies were honored for the third consecutive year: Boston Edison Co, Cleveland Electric Illuminating Co, Consolidated Gas, Electric Light & Power Co of Baltimore, Consumers Power Co, Detroit Edison Co, Ohio Edison Co, Pacific Gas & Electric Co, and Tampa Electric Co.

American Gas & Electric Co and Cincinnati Gas & Electric Co received their second consecutive award. First time winners were Commonwealth Edison Co, General Public Utilities Corp, Iowa-Illinois Gas & Electric Co, Kansas Power & Light Co, Texas Utilities Co, Southern California Edison Co, and Virginia Electric & Power Co.

Only 330 companies in the United States and Canada of the 3,000 studied received awards. Ten separate areas of management were examined: Economic function, corporate structure, health of earnings growth, fairness to stockholders, research and development, directorate analysis, fiscal policies, production efficiency, sales vigor, and executive evaluation.

Headquarters of the institute is at 125 East 38th Street, N. Y.

The Ad That Pulled

This advertisement which recently appeared in the Sunday editions of Chicago, Detroit, and St. Louis newspapers brought 60 replies:

Electric Utility Linemen

Work in warm sunshine. Permanent jobs open in fast growing Tucson, sunshine capital of the nation. Population doubled since 1941. Wonderful community for raising family. Climate frequently beneficial to arthritis, asmathics. Permanent journeymen linemen only needed. For information on job and community write to N. M. Lovell, vice president, Tucson Gas, Electric Light & Power Co, Tucson, Ariz.

Each applicant was sent information on the job, housing conditions, schools, cost of living, and recreational areas.

WASHINGTON COMMENT

JESSE MOCK

Apparent widespread interest of the electric industry in the so-called "Coudert Bill" is not shared by Congress.

The "bill," as it is commonly referred to, is technically no bill at all. What we are talking about are two House resolutions introduced on the first day of the present Congress by Rep Frederic R. Coudert, New York Republican.

Coudert 'Bill' Cold Shouldered by Congress

These resolutions would provide for a House committee study of federal activities which compete with private enterprise. Aim would be to gather information with a view to determining if and how the government may shed some of these activities.

House Resolution 12 would authorize the House Appropriations Committee to conduct the study. House Resolution 15 would put the proposed study in the hands of a specially created or "select" committee.

Electric Power Activities Only a Part . . . While some think of this proposed study as pertaining almost entirely to the government's electric power activities, it could cover a much wider area. For instance, Author Coudert has said the scope of the study may well include such diverse items as public lands, federally owned defense plants, and farm credit banks.

Up until now, there has been little effort to bring these resolutions to the attention of any wide segment of Congress. Nor is there any indication at this time that any concerted effort will be made. The few persons who have tried to sample Congressional opinion on the measures report small interest and minute enthusiasm.

Republican leadership in the House is said to be "cool" to the idea. Without this backing, the resolutions will continue to gather dust. A recent check of the rules committee, to which both measures were referred, disclosed that not the slightest move had been made to consider them. Coudert has since said he would enter a request for committee action.

Only Those with a Stake Interested . . . Lack of Congressional interest in the Coudert measures can be charged to the absence of any widespread popular sentiment for them. As far as can be determined here, there are relatively few people who have any idea what the proposed studies are all about. Support and opposition comes almost entirely from a few tight-knit groups who have some stake in the outcome of the resolutions.

Mere existence of the resolutions has served as one rallying point of the public power and rural electric cooperative organizations. Take this resolution adopted by the National Rural Electric Cooperative Association at its January convention:

"Whereas, statements have been made by public officials and others that all federal power projects should be sold to commercial utilities,

"Now, therefore, be it resolved, that any such attempt will be met with all opposition possible to protect the ownership of the people of the United States, whose investments run into billions of dollars, and to protect the consumers of electric power from possible exploitation."

On the other side of the fence, the American Farm Bureau Federation in December adopted this resolution:

"It should be the policy of the federal government to sell existing federally owned generating plants and transmission lines to private enterprises and local public institutions."

But other than these resolutions from farm groups, there seems to have been little groundwork laid on the comprehensive study proposed by Representative Coudert. If there has been, it's certainly been kept more secret than most such moves are.

Political observers here in Washington are beginning to wonder how much real thought has been given to the practicality and political implications of the proposed study. Until the Republicans have a clearer idea of what may or could come out of such a study, it is highly unlikely that anything will be done about it.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Fair weather corona level of a transmission line may be 2 or 3 times the minimum, light rain may step it up to 20 times and very adverse weather to 75 or more times the minimum.

Centralized control rooms located in the center of gravity of the power plant auxiliary load result in minimum investment in plant cable.

Interrupting both fault and load current with satisfactory reliability is the task confronting the load-break switch. Meanwhile there is lively interest in its application to large capacitor banks.

Gaseous lamps are said to be capable of putting more light on the street than fluorescents and the installed cost is reportedly substantially less.

Performance guarantees on turbines are exceeded at least seven times for each case where they are not fully met at the outset.

Turbine manufacturers should know and divulge how much sacrifice in performance accompanies blade fouling. The information would help in scheduling overhauls.

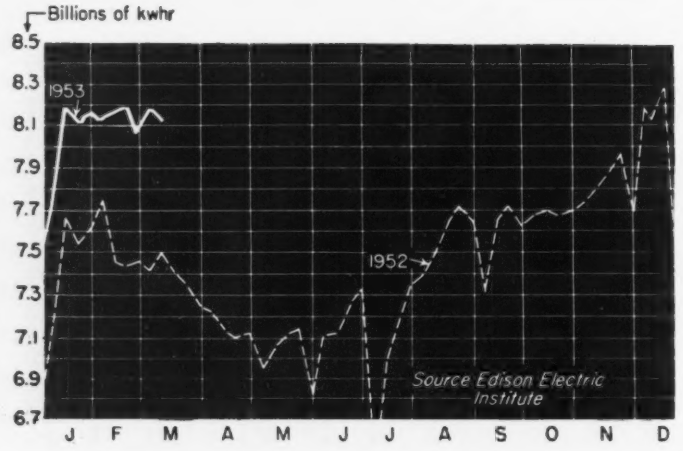
Steam reheat at a second point in the cycle would probably be warranted if it added another 2½% in efficiency to the 5% derived from the first reheat.

Motor-driven exciters reduce turbogenerator shaft lengths and thus save space, but conversely they may lose power supply during system disturbances and subsequent switching.

Corona elimination from high-voltage lines would entail use of impracticably large conductors; practicable conductors would probably experience continuous corona in rain.

Accuracy refinements cost money to achieve. Should energy users be enabled to pay a bit less for somewhat less accuracy in watthour metering or regulated to pay a bit more for present-day accuracies?

STATISTICS



Output Week Ended March 14—8,138,032,000 Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
March 14	+9.8	+11.8	+6.7	+10.9	+8.6	+12.9	+4.1	+9.4	+8.5	+12.3
March 7	+9.0	+9.4	+6.6	+10.9	+7.8	+10.9	+2.4	+10.6	+8.3	+10.7
Feb. 28	+8.8	+5.4	+5.0	+10.8	+10.5	+11.6	+2.1	+10.2	+7.1	+12.3

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Dec.	75.5	72.8	70.4
Capacity (Million Kw)	Dec.	82.05	80.91	75.54
Production (Billion Kwhr)	Dec.	36.45	33.75	33.14
Hydro		8.22	6.52	9.13
Fuel		28.23	27.23	24.04
Fuel Consumption				
Coal (Million Tons)	Dec	10.72	9.93	9.64
Oil (Million Barrels)		8.52	7.75	6.29
Gas (Billion Cu Ft)		60.54	69.94	52.43
Sales (Billion Kwhr)	Dec.	31.20	30.08	28.44
Residential		8.91	8.16	7.95
Commercial		5.21	5.01	4.77
Industrial		15.11	14.91	13.74
Other		1.98	2.01	1.97
Net Income Class A & B Companies ($ Million)	Nov.	79.81**	64.86**	69.92
Estimated Dec. '53 Peak (Million Kw)	Dec.	87.0	87.3	88.5
Kwhr per Residential Customer (12 Month Average)	Dec.	2,169	2,155	2,004
Revenue per Kwhr Residential Service (12 Month Average)	Dec.	2.77¢	2.77¢	2.81¢
Canadian Production (Billion Kwhr)	Dec.	5.54	5.22	5.11

Business Statistics

FRB Industrial Production Index†††	Jan.	233*	233	217
Gross National Product Annual Rate ($ Billion)	3rd Qtr.	343.4	342.6	337.1
E. W. 5 Industry Production Index	Jan.	130.0*	129.8**	124.4
ENR Construction Cost Index††	Feb.	123.1	123.1	114.8
BLS Consumer's Price Index	Jan.	190.4	190.7	189.1
NEMA Insulation Materials Sales Index†	Dec.	655	579	466
NEMA Electric Appliance Sales Index†	Dec.	268	251	218
NEMA Household Refrig. Sales Index†	Dec.	147	152	115
Metal prices (March 17)				
Copper, Conn. V., lb		$ .27½-.34	.24½	.24½
Lead, N. Y., lb		.13½	.13½	.19
Zinc, prime Western E. St. Louis, lb		.11	.11½	.19½
Tin, Straits, qual. N. Y. lb		1.21½	1.21½	1.21½
Aluminum, ingot, base price		.20½	.20	.19
Nickel, base price		.60	.56½	.56½
Steel, billets, Pitts., ton		59.00	59.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

*Preliminary **Revised †1936=100 ††1949=100 †††Unadjusted

The Farmer— A Vanishing American

The population living on farms numbered about 24,819,000 in April 1952, according to an estimate prepared by the Bureau of the Census and of Agricultural Economics.

The farm population dropped roughly 5½ million, or 18%, between 1940 and 1950. This change represents a sharp acceleration of the downward trend in farm population observed since World War I.

In 1916, farm population was estimated at approximately 32½ million. Following a decline during World War I and a slight increase in the first two postwar years, farm population moved downward during the decade of the 1920's. By 1930, it had fallen to a level of about 30½ million. The depression of the early 1930's reversed temporarily the previous pattern of net migration from farms to urban centers, and the farm population began to rise again.

The Farm Population
Thousands

	Total Population	Farm Population	% Total
1952	156,371	24,819	15.9
1951	153,703	24,037	15.6
1950	151,132	25,058	16.6
1945	139,583	25,295	18.1
1940	131,820	30,547	23.2
1935	127,057	32,161	25.3
1930	122,775	30,529	24.9
1925	115,402	31,190	27.0
1920	106,089	31,974	30.1
1915	100,191	32,440	32.4
1910	91,885	32,077	34.9

Farm population dropped at an especially sharp rate during World War II. From a level of 30½ million at the time of the 1940 Census, it was reduced to approximately 25½ million by 1944 and 1945. Following V-J day, farm population increased in the next two years—mainly because of the return of veterans.

Although total farm population was at about the same level in April 1952 as in April 1950, substantial changes were recorded among certain age groups. The number of children under 14 years of age living on farms rose somewhat. At the same time there was a comparable decline in the 18-to-24-year group, chiefly reflecting the continued migration of young farm residents to urban centers and inductions into the armed forces. Relatively little change was observed among those 25 years old and over.

WWP OKs Plan to Merge . . .

. . . with Puget Sound P&L. Washington Water Power directors approve basic terms of agreement worked out by the two firms

The basic terms of a proposed merger between Washington Water Power Co and Puget Sound Power & Light Co as agreed upon between the managements of the two companies have been approved by the board of directors of WWP, Pres Kinsey M. Robinson of WWP has announced.

Merger Proposal . . . The basic terms of the proposed merger are as follows:

1. Puget will be merged into WWP by statutory merger. WWP will be the surviving company and its presently outstanding common stock will be unchanged by the merger.

2. The outstanding $6 preferred stock of WWP will be called and there will be created by the merger agreement a new issue of WWP convertible cumulative preferred stock, $25 par value, with the following terms:

a. Callable at $27 upon 30 days' notice with right of conversion to the call date. There is no present intention to call all or any part of this preferred stock.

b. Convertible for 60 days after the effective date of the merger into WWP common stock, share for share, and for three years thereafter at $27.50 (being at the rate of 11 preferred for 10 common), for the next three years at $30 (being at the rate of 6 preferred for 5 common) and thereafter at $32.50 (being at the rate of 13 preferred for 10 common).

c. Dividends to be paid quarterly at rate of $1.28 per share annually.

3. Each Puget common share shall receive one-half share of new convertible cumulative preferred stock and one-half share of WWP common stock, unless the holder has elected as to all his stock to receive cash instead of stock (such election to be made at or prior to a special meeting of Puget stockholders to vote upon the merger and to be accompanied by the deposit of the stock certificates), in which event he shall receive cash for his shares at the rate of $27 per share.

4. In order to assure a non-taxable status to the transaction, the merger shall not become effective if the total of the stock of Puget electing to take cash plus the Puget stock against the merger exceeds 50% of the total outstanding common stock of Puget.

5. The merger agreement between the companies shall also provide that Puget's employees who continue in the service of the merged company shall have made available to them and shall be included in the present pension plan for Washington employees on substantially the same basis as provided for WWP employees.

6. Due to the situation of Puget in regard to its purchasing agreement with the Public Utility Districts in the State of Washington, the merger agreement between the companies will terminate as of the close of business on July 30, 1953, unless prior to that time the merger has been consummated or the merger agreement has been extended by mutual agreement.

7. An agreement between the companies shall also provide that all employees of Puget (excluding three executive officers, or directors, independent engineers, independent public accountants and legal counsel) on the effective date of the merger shall be retained in their employment by WWP for a period of at least two years at not less than the present base rates of compensation, subject to powers to dismiss for cause, or to be retired subject to the provisions of the pension plan, or to transfer employees from one position or location to another, or to change the title or designation of such employment. Employees of Puget who have been retired prior to the effective date of the merger will continue to receive from WWP payments of the same rate that they are on such date receiving from Puget as long as WWP continues to pay its retired employees retirement benefits.

In commenting on WWP's announcement, Puget's Pres Frank McLaughlin stated that the basic merger terms as approved by the WWP board represent the results of negotiations between the managements of the two companies and will be submitted to Puget's board of directors for consideration and action at an early date following the annual meeting of stockholders on March 23.

Legislature Passes No Bill . . . Hopes of private power companies to limit the power of public power districts in Washington State were dashed when the legislature adjourned March 12 without passing a single bill to restrain the PUD's.

Private power had pushed a bill to limit condemnation power of the PUD's. When this measure lost both in the House and Senate, it became apparent that none of the other anti-PUD measures stood a chance.

Condemnation actions are pending against Puget's properties. Spokesmen for a group of six PUD's have stated these suits will be pressed if their $94-million offer for all the company's properties, outside of those in Whatcom County, is rejected.

FINANCIAL BRIEFS

New England Electric System has asked the Securities and Exchange Commission approval to sell Northern Berkshire Gas Co to Berkshire Gas Co. Both companies are subsidiaries of NEES . . . **Josephthal & Co** has recommended the purchase of Public Service of New Mexico common stock around 10½ to yield 5.34% as it offers "considerable attraction for its longer term appreciation possibilities predicated on the benefits which the company should soon be able to realize from the growth and development of the service area."

AGA-EEI Accounting Program Completed

The accounting subjects to be discussed before the National Conference of Electric and Gas Utility Accountants at the Hotel Sherman, Chicago, Ill., have now been completed. This conference is sponsored jointly by the accounting division of the Edison Electric Institute and the accounting section of the American Gas Association.

The members at the principal general session on opening day, April 20, will hear Spencer B. Eddy, New York Public Service Commissioner, who will speak on accounting trends in utility

regulations. Harold Quinton, executive vice president of Southern California Edison Co, will discuss cost consciousness in a changing economy. Kenneth W. Haagensen, director of public relations of Allis-Chalmers Manufacturing Co will speak on the human side of our business. George U. Callens, assistant personnel coordinator for accounting departments of Detroit Edison Co will present an illustrated case study on supervisor selection.

Following this general session the accountants will break into groups to discuss, among other subjects, accounting techniques for the control of small expendable hand tools, budgeting and forecasting, rate of return versus interest during construction, highlights of a report on 1951 and 1952 annual reports to stockholders, a summary of various payroll practices, and functions and responsibilities of methods departments.

For reservations or further information, contact Alfred E. Softy, accounting director of the Edison Electric Institute, 420 Lexington Ave., New York 17, N. Y.

Municipal League Will Study Seattle's Rates

The chairman of the Municipal League's subcommittee on City Light at Seattle, has launched an "investigation" of City Light's new rate schedule, put into effect last year.

The investigation consists largely of the collection of rate schedules from private companies and PUD's in an attempt to show that City Light's base-period plan is "out of line" and results in unusually high rates for commercial customers and large residential users.

Under the base-rate provision, the customer's lowest use of power for any four-month period in the past year is taken as a base. After the first 450 kwhr, which costs the customer on the all-electric rate $5 a month, a 7-mill rate applies for the next 1,400 kwhr, or for the base period, whichever is higher.

If the customer has a low base and is a heavy consumer at other periods, his rate for excess use, above the 7-mill step, goes to 1.8¢. One Seattle user who lives out of town in the summer found his subsequent bills increased about $5 a month.

"After some figuring, I find I can substantially reduce my annual current

(*Continued on page* 224)

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1953									
Mar. 12	**3.11**	**3.18**	**3.26**	**4.15**	**4.32**	**4.61**	**4.93**	**5.25**	**5.57**
Mar. 5	3.11	3.16	3.26	4.16	4.32	4.59	4.98	5.31	5.63
END OF QTR.									
4th 1952	2.99	3.03	3.14	4.06	4.22	4.59	4.98	5.33	5.62
3rd 1952	2.99	3.03	3.16	4.10	4.26	4.61	5.18	5.59	5.96
2nd 1952	2.95	3.00	3.09	4.05	4.31	4.60	5.38	5.85	6.42
1st 1952	2.95	2.99	3.13	4.11	4.29	4.66	5.35	6.03	6.47

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Months Ended		Net Income		Earnings Per Common Share	
			1953	1952	1953	1952
El Paso Electric	12	Jan.	$1,555,599	$1,465,052	$1.95	$1.83
Public Service of Indiana	12	Jan.	10,129,293	8,525,272	2.40(a)	2.17(a)
			1952	**1951**	**1952**	**1951**
Atlantic City Electric	12	Dec.	$2,779,980	$2,496,199	$1.81	$1.65
Central Illinois Light	12	Dec.	3,002,698	2,999,530	2.78	2.78
Home Light & Power	12	Dec.	172,769	150,735	3.98	3.47
Interstate Power	12	Dec.	2,390,841	1,900,604	0.89	0.80
Iowa-Illinois Gas & Electric	12	Dec.	4,199,641	4,041,995	2.20	2.12
City of Jamestown	12	Dec.	154,237*	90,053	....	....
Long Island Lighting	12	Dec.	6,311,930	4,971,137	1.26(g)	1.37(g)
Northern Indiana Public Service	12	Dec.	8,471,523	7,769,865	2.33(c)	2.21(c)
Public Service Electric & Gas	12	Dec.	23,529,583	23,093,887	2.02(e)	2.28(e)
Puget Sound Power & Light	12	Dec.	3,260,917	3,538,308	1.50	1.62
Shawinigan Water & Power	12	Dec.	5,193,501	5,045,576	1.91	1.84
Wisconsin Public Service	12	Dec.	3,667,757	3,395,909	1.36(f)	1.37(f)

Notes—Figures shown for the last twelve companies have been audited.
*—Loss. (a) Based on 3,780,768 shares in 1953 and 3,573,995 shares in 1952; (b) Based on shares outstanding at the end of the period; (c) Based on 3,094,013 shares in 1952 and 3,020,620 shares in 1951; (e) Based on 7,221,945 shares in 1952 and 6,406,655 shares in 1951; (f) Based on 2,218,070 shares in 1952 and 2,000,000 shares in 1951; and (g) Based on average number of shares outstanding during the year.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF MARCH 12-18			
Bonds			
Lake Superior District Power—1st mtg 3¾% due 1983	$2,000	$101.814	3.65%
Mississippi Power & Light—1st mtg 3⅝% due 1983	12,000	100.456	3.60
Preferred Stock			
Public Service of New Mexico—30,000 sh 5.00% $100 par	$3,000	$100.00	5.00%
Common Stock			
Public Service Electric & Gas—750,000 sh	$20,000	$26.875	5.95%
SCHEDULE FOR MARCH-APRIL			**Bid Date**
Bonds			
Georgia Power—1st mtg due 1983	$16,000	.....	March 24
Dallas Power & Light—1st mtg due 1983	9,000	.....	March 24
Public Service of Oklahoma—1st mtg due 1983	6,000	.....	March 31
California Electric Power—1st mtg due 1983	8,000	.....	April 6
Brockton Edison—1st mtg due 1983	4,100	.....	April 6
Florida Power & Light—1st mtg due 1983	15,000	.....	April 7
Kentucky Utilities—1st mtg due 1983	10,000	.....	April 7
Texas Electric Service—1st mtg due 1983	7,000	.....	April 13
New Orleans Public Service—1st mtg due 1983	6,000	.....	April 14
Preferred Stock			
Georgia Power—100,000 sh no par	$	.....	March 24
Texas Electric Service—100,000 sh no par	.....	.....	April 13
Louisiana Power & Light—60,000 sh $100 par	6,000	.....	April 21
Common Stock			
Kentucky Utilities—208,057 sh (to be offered commonholders on 1-for-10 basis, record March 20 to expire April 13)	.....	.....	.....
Southern Indiana Gas & Electric—114,167 sh (to be offered to commonholders on 1-for-6 basis, record March 25 to expire April 10)	.....	.....	.....
California Electric Power—163,249 sh	.....	.....	March 31
Central & South West Corp—606,084 sh (to be offered commonholders on 1-for-14 basis, record April 1 to expire April 20)	.....	.....	.....
Southern Co—1,004,869 sh (to be offered to commonholders on 1-for-17 basis, record April 16 to expire May 7)	.....	.....	.....
UNSCHEDULED AND UNDER CONSIDERATION			
Bonds			
Monongahela Power—1st mtg	$10,000	.....	.....
Metropolitan Edison—1st mtg	8,000	.....	.....
Pennsylvania Electric—1st mtg due 1983	12,500	.....	.....
Public Service Electric & Gas—1st mtg	50,000	.....	.....
Blackstone Valley Gas & Electric—1st mtg	5,800	.....	.....
Southern California Edison—1st mtg	25,000	.....	.....

Degree-Day Tab Warns of Ice Ahead

P. M. **HESS**, Assistant Superintendent of Operation, Pennsylvania Water & Power Co, Lancaster, Pa.

Temperature records now warn operating personnel of impending ice trouble at Safe Harbor Dam of Pennsylvania Water & Power Co. Records kept during its 21 years of operation show that an accumulation of freezing degree days exceeding 150 leads to trouble all along the Susquehanna River when the ice breaks up. Lesser accumulations over a long period may cause less extensive trouble.

The term "degree days" in this particular case means the average temperature for the day expressed as degrees C below zero. The starting point of each curve is the day the pond first freezes over solidly. From that time on, the accumulated degree days are plotted against duration in days.

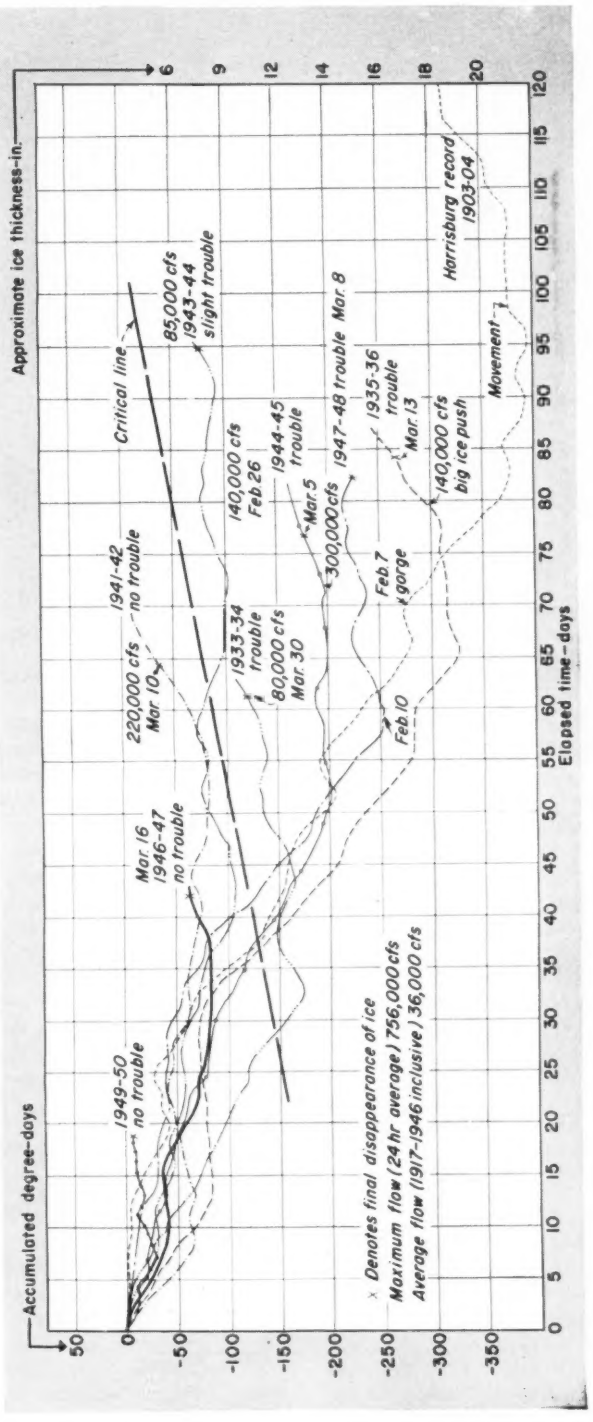
Sub-freezing temperatures cause a downward slope of the curve, denoting the formation of more ice. Zero C extends the curve horizontally and does not form or melt ice. Above-freezing temperatures cause an upward slope and tend to disintegrate existing ice. These data are found to give a reasonably accurate estimate of the ice thickness, although a deep snow cover reduces the rate of freezing.

Curves Predict Severity of Ice Breakup . . . Final disintegration or passage of ice usually occurs during the first half of March. However on rare occasions it may occur as early as late December. The curves, although not of high accuracy, are helpful in predicting the severity of the ice breakup and enable the company to prepare in advance for anticipated trouble. Experience indicates that usually no trouble is experienced when the plotted cumulative degree days and duration stay above the "critical line." If it crosses this line, however, it is fairly certain that trouble will be encountered at many places along the river above Safe Harbor. When the accumulation exceeds 150 degree days, regardless of duration, ice movement causes trouble all along the river.

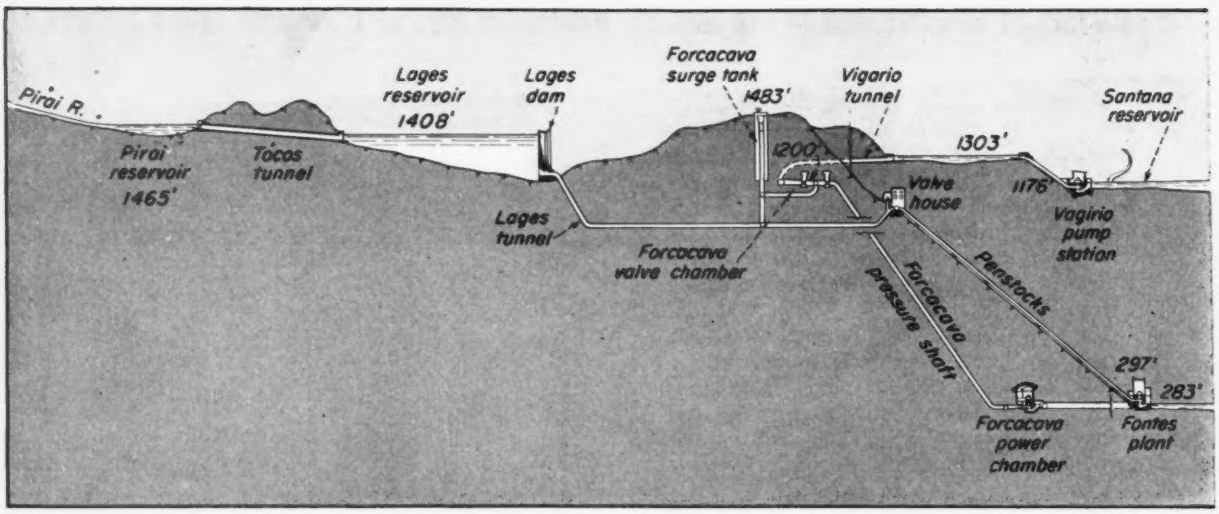
Cumulative Degree Days Once Reached 393 . . . The famous winter of 1903-04 occurred long before construction of Safe Harbor Dam. Records indicate that the freeze started about Nov. 30. With 277 degree days, ice gorges developed Feb. 7. The cumulative degree days reached 393 on March 5. Then several days of rain moved the ice. That experience is still known as the "Harrisburg Record."

These data apply specifically only to the Susquehanna River in the vicinity of Safe Harbor. The Susquehanna is a broad river, fed by many mountain streams. But it may well be found that the method will apply to other locations where ice breakup constitutes a serious operating problem.

Accompanying graph has selected year-curves when no trouble was experienced and others when extreme difficulties were encountered.



Cumulative degree (C) days after first solid freeze of Safe Harbor headpond measure thickness of ice formation. Crossing the critical limit warns of ice trouble during the subsequent breakup



DIVERTED WATER from the Paraiba River at the right is lifted 33 ft into Santana Reservoir, then up 115 ft to Vigario Reservoir. Water is then usable at Forcacava Plant, or the Vigario pumps can be reversed during peaks and used as generators to add 50,000 kw to the system

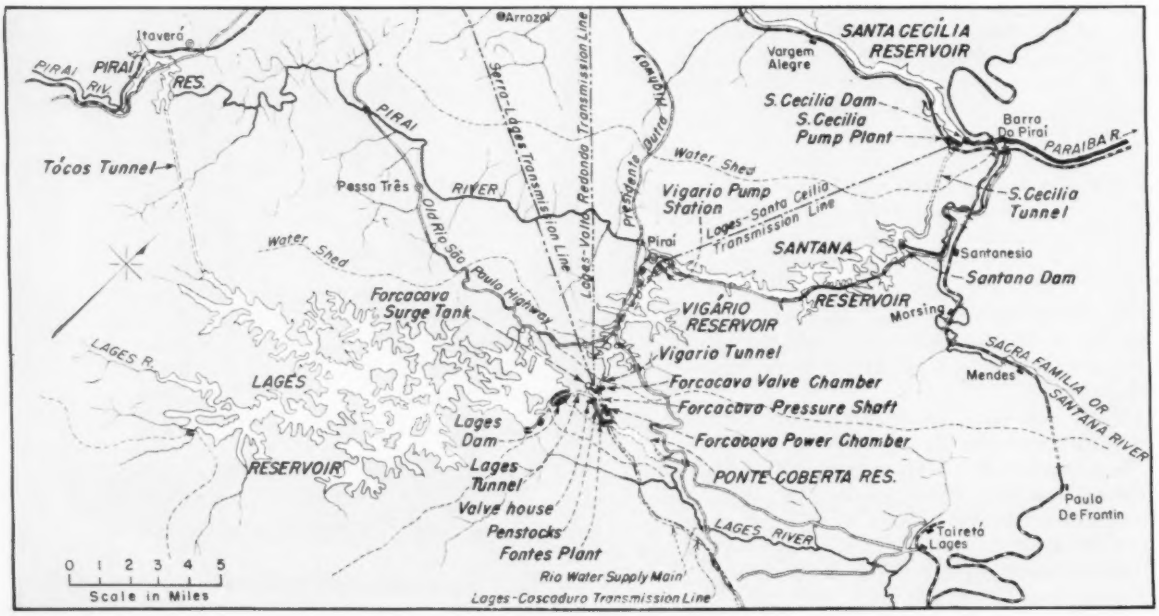
Underground Hydro Plant Boosts

Brazilian utility dams the Paraiba River and diverts its flow to make it nine times as useful. Forcacava Plant built in an excavated cavern will have a capacity of 330,000 kw

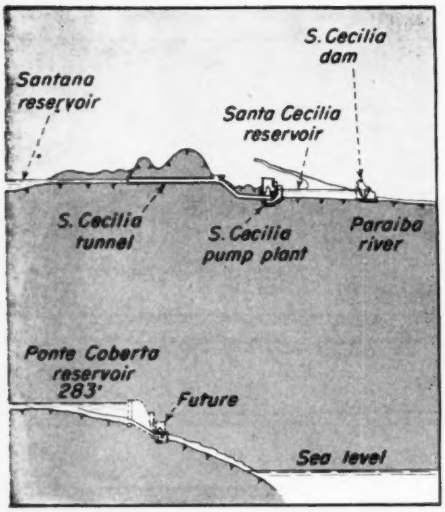
E. A. JOHANSON, Canadian-Brazilian Services, Ltd, Toronto, Canada

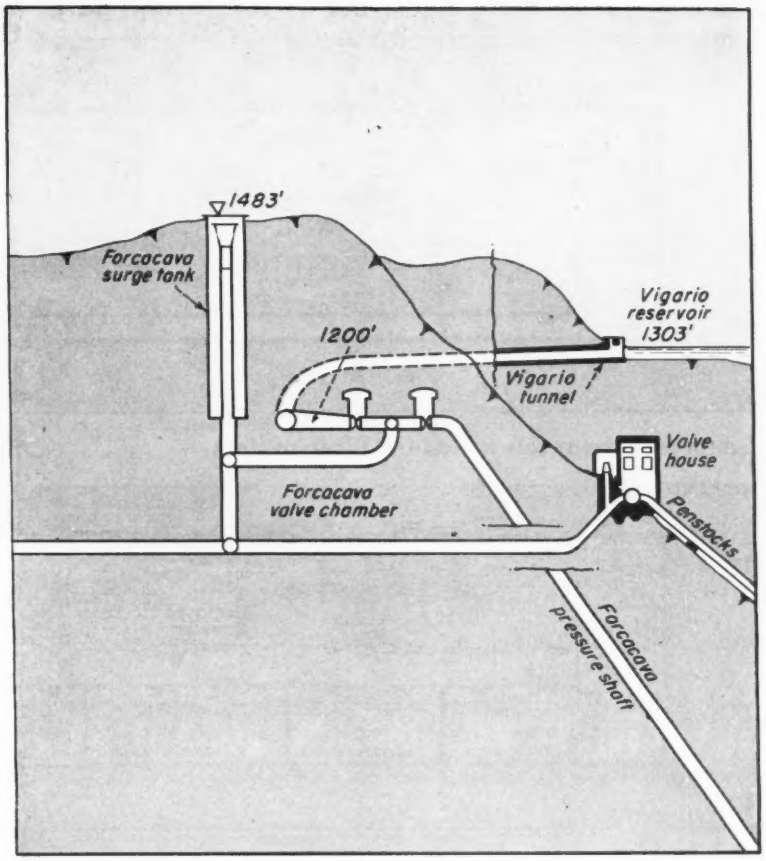
To meet a power demand increase of 9% per year, Rio de Janeiro Tramway, Light & Power Co, Ltd, a subsidiary of the Canadian corporation, Brazilian Traction, Light & Power Co, Ltd, of Toronto, is reversing water flow up the Serra do Mar, an inland plateau 1,000 to 2,500 ft high. One of the inland-flowing streams, the Paraiba, is dammed at Santa Cecilia and diverted 18.5 mi to Forcacava. The 5,650 cfs of water is pumped at Santa Cecilia and Vigario for a total lift of 145 ft.

The first project to divert inland-



COMPONENTS of the Forcacava hydroelectric project are shown on the map. The area is located to the northwest of Rio de Janerio





FONTES VALVE HOUSE and Forcacava valve chamber control flow from reservoirs through penstock or pressure shaft to turbines designed for 1,000-ft head. One surge tank serves both

Rio Power

flowing streams to the escarpment and utilize the high head, was built in 1913 at Tocos on the Pirai River. This development permitted adding two 10,000-kw units in the Fontes power plant. Between 1941 and 1948 the Lages Dam was raised 92 ft in stages and three 35,000-kw units were subsequently added at Fontes.

The Paraiba-Pirai project will reduce the energy available downstream at Ilha dos Pombas, but the diverted water will generate about nine times the energy at Forcacava that it could at Ilha. Most of the pumping is done with offpeak power.

The dam at Santa Cecilia is 853 ft long, designed with its sill below the normal river bed so the heavy silt in the water passes downstream.

From the reservoir at Vigario, a 4,500-ft canal and a 1,970-ft tunnel carry the water down to the Forcacava plant valve chamber.

The Forcacava underground plant, will have a capacity of 330,000 kw. Estimated total excavation is 313,000 cu yd of solid rock and earth of which 87,400 is for the power cavern and the rest for valve chamber, tailrace, pressure shaft, surge tank, cable tunnels and ventilation shaft.

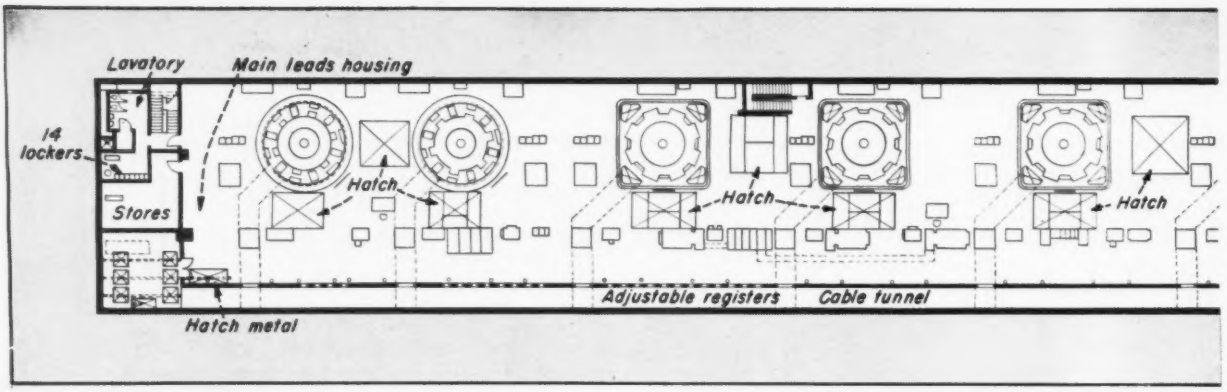
The Valve Chamber is comprised of two parallel chambers, two connecting galleries and one side gallery, and can house eight 17-ft butterfly valves. Five valves will be installed initially to route the water from Lages or the Paraiba-Pirai Diversion. A distribution header runs parallel to and midway between the chambers and connects with a tunnel to the Lages Reservoir. A surge tank is located on this tunnel. There is a 75-ton capacity crane in each valve chamber, so arranged that the trolleys can run off the crane bridge onto the rails in the cross galleries.

The Power Cavern is 62 ft wide by 377 ft long by 85 ft high and is sited with its crown about 380 ft below ground, connecting to the outside by a 541-ft horizontal access tunnel. It contains three floors—turbine, generator, and main—plus storage, ventilating, elevator, and service space. The power cavern roof forms an arch, reinforced by a concrete supporting arch. The concrete walls of the cavern are also in direct contact with rock and adequate drainage has been provided to relieve external hydrostatic pressure.

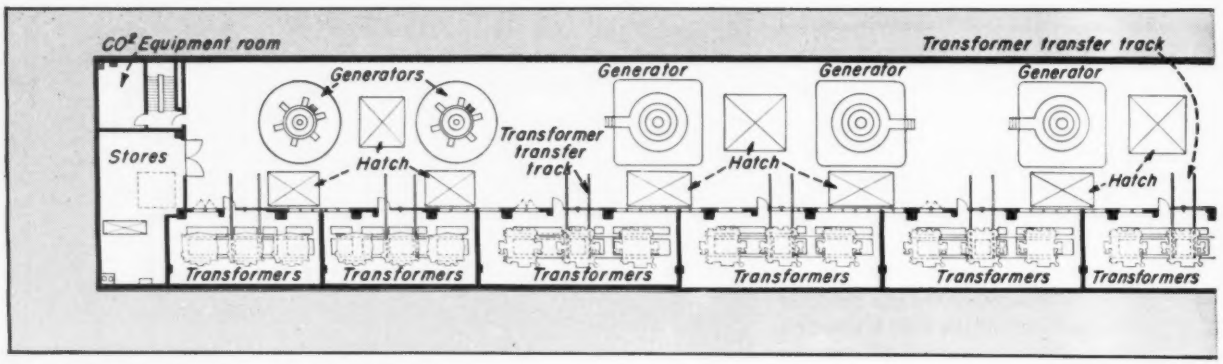
The Turbine Room Floor contains hydraulic operating equipment and piping. A spherical valve is installed between each wye branch and the turbine, and stop logs are provided at the discharge end of the draft tubes. Hatches in the generator and main floor allow dismantling of the valves by the cranes located in the main powerhouse.

The Generator Room Floor contains the generator control boards, the ac and dc station auxiliary boards, and the service transformers. To reduce fire hazard, oil equipment was ruled out: the transformers are natural draft dry type and all breakers air type. A tunnel from this floor carries the 138-kv, high oil-pressure, pipe-encased cables from the step-up transformers to the switchyard. The tunnel also carries control and auxiliary power cables.

Plan of power house shows 377-ft length and 62-ft width



Generator floor elevation is 90.6 meters



Main floor elevation is 95.15 meters

Engineering Details Bring Out Advantages

Comparative estimates of running low tension leads versus high tension leads led to installing the step-up transformers inside the cavern. Two 125-ton cranes when coupled together will handle the heaviest load, the generator rotor.

The Access Tunnel goes in at the east end of the power cavern for movement of equipment and personnel. It is provided with a concrete lining, is horseshoe shaped, with the base 19 feet wide and with a height of 26 feet clear inside. The slope is approximately 2% downward toward the cavern.

Dimensions for excavating this tunnel were dictated by the steel wye branches of the distribution manifold, which have to pass through this tunnel before the concrete lining is applied. All other permanent equipment of the plant can pass through this tunnel after its concrete lining is applied. The tunnel terminates in a portal structure which provides space for oil storage, filtration and pumping equipment, as well as equipment for the 138-kv, high oil-pressure cable installation.

Electrical Connections and Control . . . The unit generator scheme is employed for connecting the generator and power transformer to the 132-kv, high-tension busses. Only for the first two units, where the generator leads have been tapped for the station service transformers, have low-tension disconnecting switches been provided.

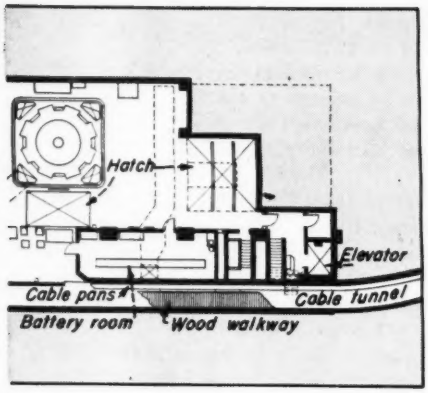
An above-ground, central control building was constructed to house the controls of all future plants as well as the transmission lines. The installation of this control room in the Forcacava underground plant would not have been justified, since it would not have been centrally located as is most desirable.

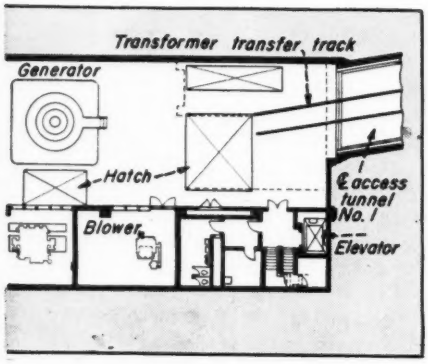
Turbines . . . There are six turbines of the vertical "Francis" type discharging into elbow draft tubes, and having welded steel spiral casings. Four of these turbines are rated 80,000 hp at a net effective head of 1,000 ft and a 50-cycle speed of 375 rpm and are capable of delivering a maximum of 88,000 hp. The other two turbines will deliver 52,570 hp at the same head and 50 cycle speed of 600 rpm.

Generators . . . Each generator is of the vertical type with two guide bearings and one thrust bearing. Closed air circuit ventilation is used.

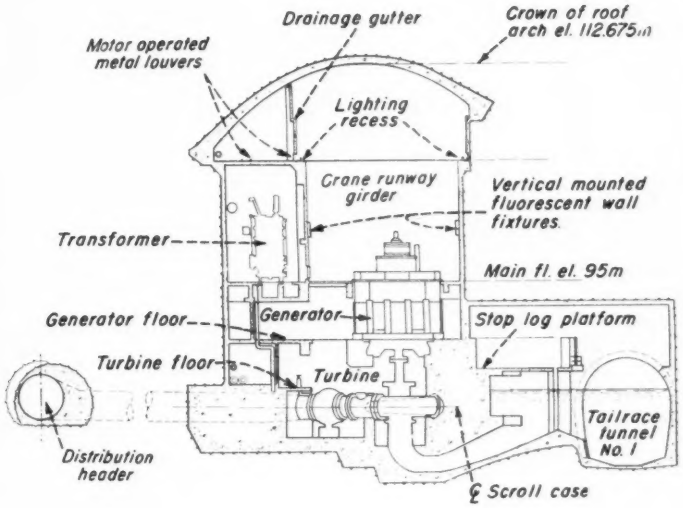
Four of the generators have a rating of 65,000 kva, 375 rpm, 0.85 pf, 11.5 kv, 50 cycles. The Kingsbury thrust bearing of each of these generators supports a total load of 803,000 lb. Owing to shipping limitations, the rotor will be assembled at site.

The other two generators are rated





Cutaway View Provides a Quick Guide



SECTION SHOWS the subterranean powerhouse of the Forcacava project. Distribution header and the tailrace tunnel are bored at the scroll case elevation.

and Features of Forcacava Plant

at 35,000 kva, 600 rpm, 0.85 pf, 6.6 kv, 50 cycles. The thrust bearing of each generator supports a total load of 289,500 lb and is of the Kingsbury type. These two smaller units were originally intended to be installed in the existing above-ground Fontes plant.

Power Transformers . . . The unit step-up transformers consist of banks of three single-phase units, forced oil, water cooled, rated 17,500 kva for use with the smaller units and 25,000 kva for use with the larger ones. The former have internal water cooling coils; the latter have the oil cooled in external water-cooled heat exchangers.

138-Kv Power Cable Installation . . . The high oil-pressure, pipe-encased cables carry the output from the underground 132-kv transformers to the outdoor switching yard, approximately 1,200 ft. The installation consists of six circuits each in a steel pipe. Each circuit, containing three single-phase cables of 500 MCM, is capable of carrying the maximum output based on generator overload capacity. The steel pipe enclosing a three-phase circuit of three cables has an outside diameter of 6⅝ in.

Illumination . . . The indirect lighting on the main floor comes from continuous rows of three 40-w lamp fluorescent fixtures, located on each side of the domed ceiling behind the powerhouse crane rails, with the light directed upwards to be reflected from the dome. This lighting is supplemented by specially designed six 40-w lamp fluorescent fixtures with molded plastic covers which are mounted with the lamps in a vertical position along both longitudinal walls of the cavern.

For lighting the generator and the turbine floors, clear glass prismatic lens fixtures with 300-w incandescent lamps are used.

Ventilation . . . All fresh air is brought into the power cavern via the access tunnel, the air being induced by means of three principal blowers. One blower of 75,000 cfm capacity ventilates the transformer cubicles by drawing air from the main floor area through louvred openings in the front wall of the six transformer cubicles, and discharges the air to the surface through a ventilation shaft cut through the rock. A second blower of 55,000 cfm capacity takes air from the main floor and forces it down to the generator floor. Some 20,000 cfm of air are exhausted through the cable tunnel to the switchyard, and the remainder is drawn to the turbine floor by six vaneaxial fans which exhaust to the tailrace. The third blower of 25,000 cfm capacity supplements the air supply to the generator floor.

POLE FALLING accidents and unbalanced load demonstration was given by H. F. Whitney (left), Southern Bell T&T safety supervisor, at Southern Safety Conference. Looking on are H. E. Hatfield, Georgia Power, chairman of Utilities Section of the conference; J. C. Dalton, Southern Bell; and Arthur J. Naquin, New Orleans PS, executive vice president of conference

Safety Problems Discussed

Human relations called an important factor in the success of a company's program at conference held in Atlanta

Utility companies' safety programs, as well as their employee relations programs, will show better results if they first do a real job of human relations, according to W. H. Joiner, Georgia Power Co. He addressed the Utility Section of the Southern Safety Conference, held in Atlanta, Ga., March 1-3.

Joiner said utility safety men probably have an opportunity to come in more intimate contact with some employees than the employees do with their own superintendents. Often times the employee will "take his hair down" to a safety man in whom he has confidence, more readily than he will to his own superintendent. He said that a good safety man will gain the confidence of the men and never betray it.

Safety programs have saved 700 lives and prevented 5,700 accidents at American Telephone & Telegraph Co, according to E. S. Miner of that company. He said that of fatal injuries to plant men, 41% were from electric shock, 32% motor vehicles, 17% falls, and 10% from all other causes.

Demonstrations . . . A panel discussion and electric safety demonstrations were staged for the group by telephone company safety engineers, including unusual electric shock accidents, pole falling accidents and unbalanced load, and gas hazards in manholes.

In a panel discussion among electric utility safety engineers, Jack Davis, Tampa Electric Co, stated that his company's new safety procedure for using and handling rubber gloves has reduced rejects from 17 to 4% in two years. He said that each lineman has his own two pairs of well-fitting rubber gloves which are tested every 60 days by ETL. Five of the companies represented at the meeting reported that they attempt to fit their linemen with rubber gloves of the proper sizes and seven said that they test their gloves every 30 days. One company tests them every ten days.

J. L. Weeks, South Carolina Electric & Gas Co, reported that his company has no specific training program for the use of rubber gloves. He said that the men all know what to do. Big trouble is in getting them to do it, he added.

H. E. Hatfield, Georgia Power Co and Chairman of the Utilities Section of the Conference, recommended use of fiber and plastic guards.

'Hard Hats' Pay Off . . . T. O. Mc Knight, Gulf States Utilities, said that linemen in his company are not permitted to work on lines over 600 v for the first six months. He reported that Gulf States' 100% "hard hat" program is really paying off. He said that tests by his company proved that hard hats were 8 to 12 F cooler in the sun than dress straw hats. Thermometers placed inside hats were read every 30 minutes.

All of the companies represented reported that they used the manufacturers' standards in writing their specifications for protective equipment.

Arnold Moore, Mine Safety Appliance Co, stated that not one lineman in 100 has his gaffs properly sharpened. He said that aluminum alloy gaffs do not provide the necessary spring action. Only four companies represented at the meeting reported that they were using aluminum alloy gaffs. Hatfield described a new program being tried by Georgia Power for sharpening gaffs.

Preparations Being Made for Light Jubilee in '54

Edison Electric Institute Board has approved the aims for next year's Diamond Jubilee of Light, marking the 75th anniversary of Thomas Edison's development of the incandescent electric lamp, and has selected N. W. Ayer & Son, Inc, to act as public relations consultants. Programs and materials for the jubilee are now in the initial stage of preparation.

Light's Diamond Jubilee Program Planning Committee is headed by George H. Blake, president, Public Service Electric & Gas Co. Associated with him on the policy-making group are Ralph J. Cordiner, president, General Electric Co; B. L. England, president, EEI and Atlantic City Electric Co; P. H. Powers, president, West Penn Power Co; Gwilym A. Price, president, Westinghouse Electric Corp; and J. R. Whiting, president, Association of Edison Illuminating Companies and chairman, Consumers Power Co.

Utility Plans for Emergencies...

. . . are discussed at conference of Engineering and Operating Section of Pacific Coast Electrical Association

Plans a utility can make in advance of an emergency situation were discussed at the annual conference of the Engineering and Operating Section of Pacific Coast Electrical Association held March 5-6 at Long Beach, Calif. Forecast of sales and capacity to 1957 and European practices in switchgear and substations were other major topics discussed at the meeting.

Two factors must be considered in planning for emergencies, said R. V. Jones, Pacific Gas & Electric Co, in addition to normal channels of supervision and communications. These are availability of trained and loyal men and material, tools, and food and shelter for them.

PG&E Program . . . Standing company order is that general construction department crews and equipment can be used immediately in emergencies. Division headquarters are kept advised of locations of various equipment and crews. In addition to regular company construction and transportation equipment for use in emergencies, Jones said PG&E has blanket contracts with firms owning trenching machines, cranes, diggers, etc, to rent them at set prices whenever necessary. To provide hot meals for emergency crews, he said, arrangements have been made with restaurants in three cities in one division to feed men at any time and bill the company later.

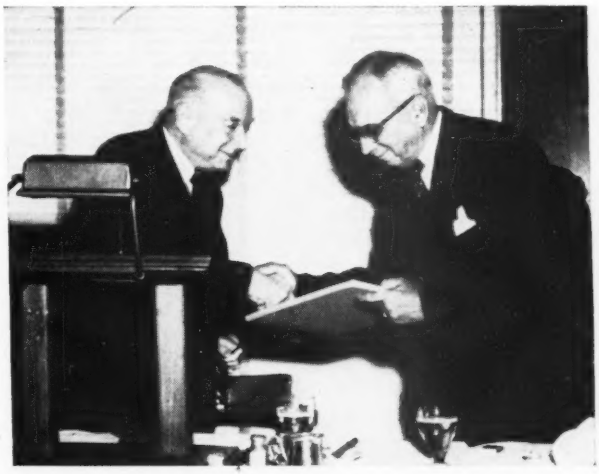
Preventive planning, as reported by D. A. Denholm, Southern California Edison Co, rests upon taking full advantage of recommendations of experienced operating men when stations or system components are being designed or rearranged. While economics, switching flexibility and service reliability must be considered, operating men rather than designers are better qualified to foresee operating problems which might arise in emergencies, he said.

Kwhr Increase . . . Total energy sales will reach 426 billion kwhr by 1957, said R. W. McLean, Westinghouse Electric Corp. Projecting this growth rate (7% compounded) to 1968 means a doubling of 1952 sales of 348 billion kwhr, he declared McLean predicted total generating capacity will be 131 million kw by 1957, an increase of about 50 million kw over present capacity. But as shortages of critical materials cut the 9 million kw of new generation planned for last year to 6 million, so will shortages again reduce the 12 million kw slated for 1953 to about 8 million, he said.

European and American practices of single-pole vs three-pole reclosing were presented by M. H. Hobbs, Westinghouse Electric Corp. Very little reclosing on high voltage lines exists in Europe. Where it does exist, speed of reclosing is not as rapid as ours and ½ sec seems as fast as is required, although some breakers will reclose faster, he said. Single-pole reclosing seems limited to French systems, nevertheless manufacturers are required to supply breakers with three mechanisms to be suitable for single-pole reclosing, he added.

In America, where stability is a factor, single-pole reclosing serves a specific purpose, Hobbs noted. However, its use has been limited because of considerable improvement in high-speed tripping and reclosing times now obtainable on large power breakers, he said. Limit in line length at 220 kv and above where de-energizing of one phase will extinguish an arc to ground is another deterrent. Lines longer than 50 miles at 220 kv should be analyzed carefully to determine feasibility of single-pole reclosing, he declared.

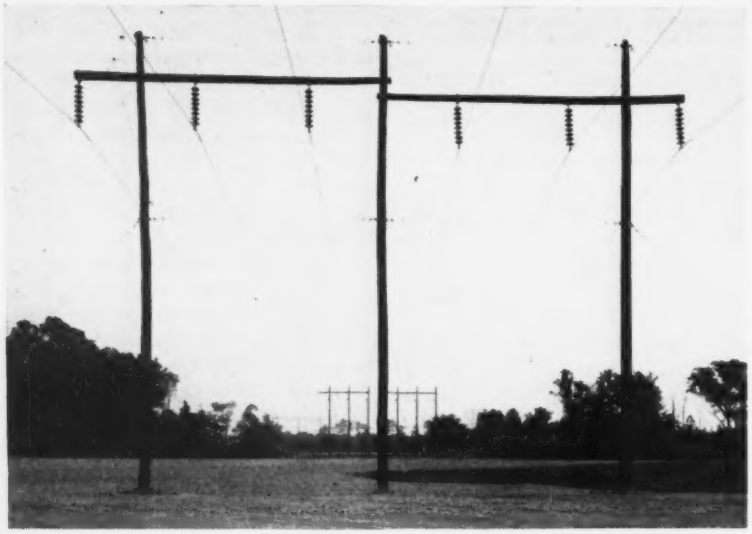
In comparing European and American switchgear and substation practices, Hobbs pointed out these major differences: Most indoor station voltages are carried up to 33 kv, 66 kv, and even 115 kv; breakers on the continent are mostly oil poor or air blast, in more or less open cells; in England, oil breakers with armor clad switchgear up to 66 kv are likely to be found. Although protective relays are used widely, he added, types are less varied than in this country.



Nema Awards a 50-Year Certificate

Carl H. Bissell, (right, above) vice president of engineering, Crouse-Hinds Co, recently received a certificate from National Electric Manufacturers Association in recognition of a half century of service in the electrical industry. Nema President L. G. Hall, head of Stackpole Carbon Co, made the award at the association's winter conference in Chicago.

Bissell began his career in 1900 as a draftsman with Onondaga Dynamo & Motor Co, Syracuse, N. Y. He joined Crouse-Hinds two years later. In 1907 he was made chief electrical engineer, a post he held until his appointment as vice president in 1950.



TANGENT STRUCTURE on 3-pole design, double-circuit H-frame line for 115-kv service has pole crossarms. Cost of this installation is 10% less than double-circuit steel tower line

New 115-Kv Double-Circuit H-Frame

Lowers Line Costs

A new 115-kv, double-circuit wood H-frame design line constructed by the Virginia Electric & Power Co is estimated to cost 10% less than two-circuit steel tower lines. Installing only one circuit of this double-circuit wood line requires an investment 25% less than installing a double-circuit steel tower line with only one circuit. The second circuit can be installed with the first circuit operating at 115-kv.

J. A. RAWLS, Supervisor, Electrical Equipment and Transmission, Virginia Electric & Power Co, Richmond, Va.

This wood pole line is more reliable under sleet conditions than the steel line with vertical configuration. Furthermore it has only about one-ninth as many lighting outages as a steel line with reduced ground resistance.

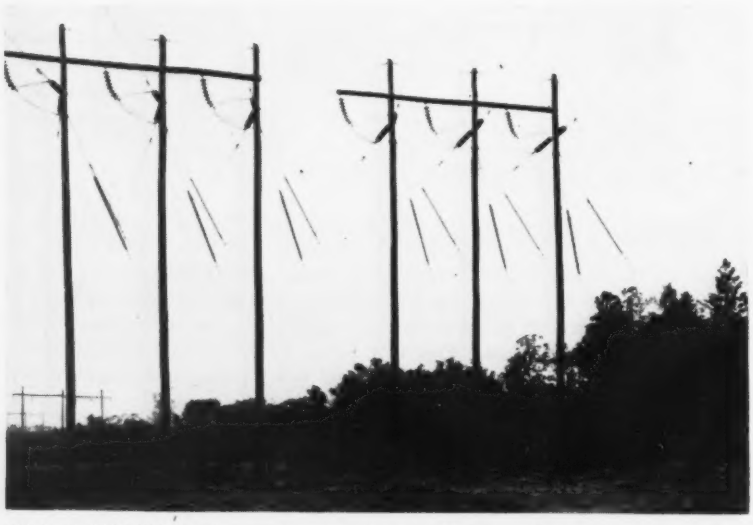
This new double-circuit design has proved so advantageous that it is being used for a single-circuit wherever it is anticipated that a second circuit will be required in the future.

In 1950 it was found that certain locations on our system required double-circuit lines although single-circuit lines had been adequate. For certain lines it is essential that outages be kept to a minimum. Steel tower lines had not met this requirement while wood lines with overhead shield wires had proved quite satisfactory.

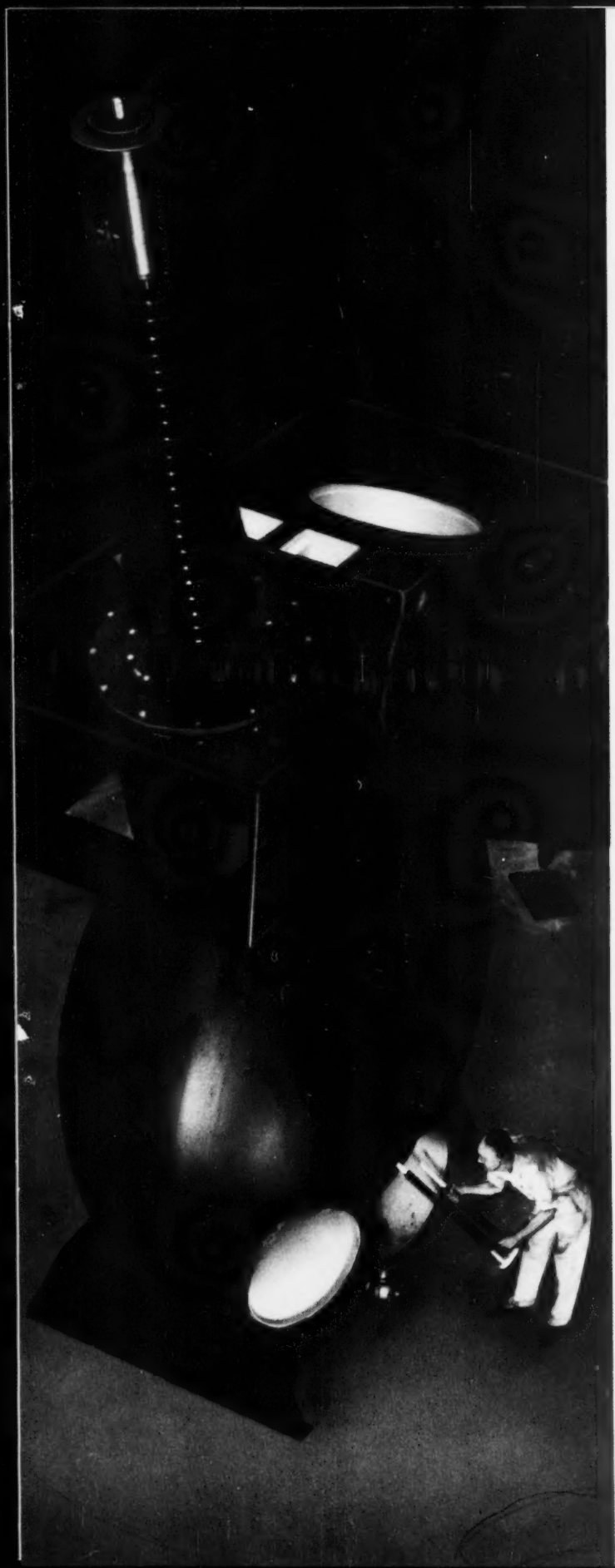
Vepco's H-Frame Line . . . Because this requirement had to be met, a double-circuit H-frame line for 115-kv service was designed. This line consists of three vertical creosoted pine, Class 2 or 3 poles set 26 ft apart. The crossarms, which are mounted 5 ft from the top of the poles, are made from two poles each 33½ ft long. The two pole arms are connected to the center pole independently—one above the other. The conductors are suspended from the pole arms on adjustable bands. Eight 5¾ by 10 in. standard ball and socket insulator units are used per string. Each circuit has 12-ft phase separation with 16-ft between the two circuits.

Three overhead ground wires are used—one attached to the top of each pole with adjustable pole bands. These three overhead ground wires are connected together at the top of the poles. One flying tap is connected to the center overhead ground wire approximately 6 ft out from the pole which strikes the pole approximately 17 ft below the top and continues to the bottom where eight turns of wire are placed around the pole before it is set. The ground resistance readings of all ground connections are measured before connecting the drop wire to the overhead ground wires.

Wood Line Cheaper Than Steel . . . A 115-kv, double-circuit wood line requires a 130-ft wide right-of-way. All estimates indicate that the double-circuit wood line is 10% less costly than the steel line, even if the steel could have been secured. It's anticipated that the double-circuit wood line with three overhead ground wires will be as resistant to lightning flashovers as the single-circuit wood H-frame line with two overhead ground wires. When both circuits are constructed at the same time, the possibility of leaving out the center overhead ground wire is being studied.



ANGLE STRUCTURE for line employs six poles for added strength. Wood strain insulators maintain impulse level. Anchor structures follow a similar but more complicated pattern



1876 75 1953
YEARS OF ELECTRICAL PROGRESS

WORLD'S LARGEST IMPULSE BREAKER

Newest G-E Breaker will go to work for American Gas & Electric

These 330-kv circuit breakers—the highest rated impulse breakers ever built—mark another top achievement in GE's historic development of high-voltage transmission protective devices.

They are the first breakers of their size and are the latest, most powerful members of GE's family of outdoor power circuit breakers.

Within several months, six of these breakers—of 15,000,000-kva interrupting capacity—will take over the job of protecting the 330-kv transmission lines of the American Gas and Electric System. Next year, another nine breakers—even larger at 25,000,000 kva—will be added to the A.G. & E. System.

During 1954 and 1955, a total of 32 G-E breakers of 25,000,000-kva interrupting rating will be put to work on other 330-kv systems being planned or now under construction.

As they assume the task of protecting the 330-kv systems, these giant steel-clad breakers symbolize the far-ranging creative research and engineering which made them possible.

For more than a half-century, General Electric has built power circuit breakers. G.E. made its first oil interrupting device, known as an "oil switch," 50 years ago. This was the forerunner of its large family of power circuit breakers.

As leader in the development of switchgear to handle tomorrow's loads, G.E. through the years, has pioneered the first high-capacity testing laboratory as well as the impulse power circuit breaker and the high-speed reclosing mechanism—all designed for the growing power needs of the nation.

GENERAL ELECTRIC

HIGHEST RATED impulse breaker, this blue, steel-clad giant is the forerunner of the 330-kv line. Interrupting ratings of G-E breakers will range from 100,000 kva to 25,000,000 kva.

25 MILLION KVA BREAKER

once a dream now a reality

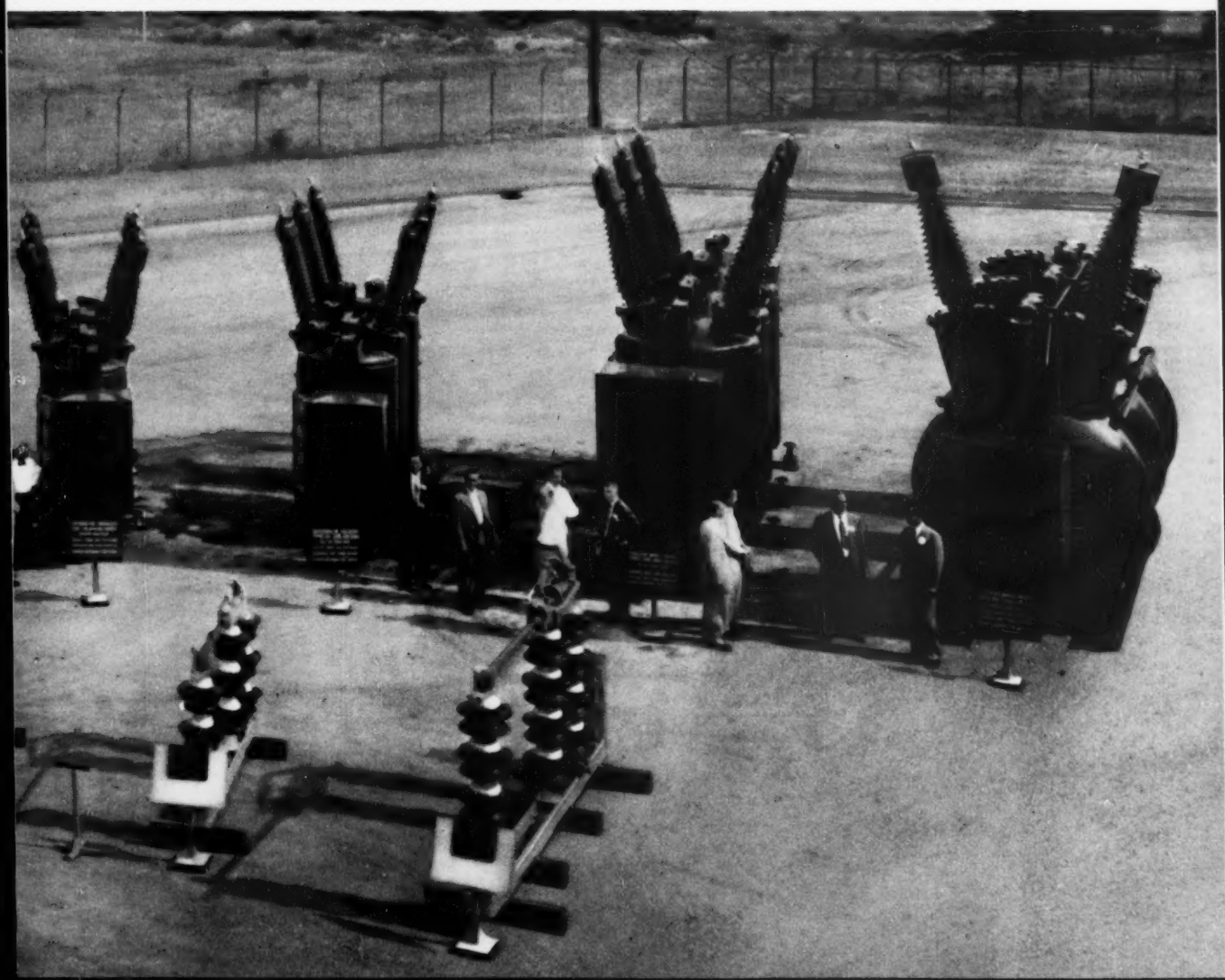
Protection of cross-country 330-kv lines for transmitting large blocks of power from major generating stations at American Gas and Electric points up the importance of GE's impulse breakers.

Climax of 20 years of intensive development, this newest switchgear advance permits use of the highest voltages ever employed in this country.

The breaker incorporates the long-tested impulse principle of interruption, proved in years of service ever since the first impulse units were built in 1934. Interrupting rating of 25-million kva, 3-cycle interrupting time, 20-cycle reclosing time, and a rating of 1600 amperes continuous current are features of these new breakers.

GENERAL ELECTRIC

GE'S NEW 330-KV BREAKERS JOIN THIS IMPRESSIVE FAMILY OF UNITS NOW RATED UP TO 230 KV.



MULTIMILLION KVA "FACT FINDER." New G-E Switchgear Development Laboratory provides tests to determine new facts for switchgear performance of the future.

NOW—ENGINEERS PROOF-TEST EVEN HIGHER RATINGS

Switchgear Development Laboratory Speeds Breaker Design

With the world's highest capacity testing facilities available in their new Switchgear Development Laboratory, G-E engineers are already designing equipment beyond the present high-voltage ratings.

They know that the nation's growing power needs, expanding as they are day by day, tomorrow will demand equipment for voltages higher than 330-kv—and require interrupting ratings greater than 25,000,000 kva.

At the multimillion-kva "fact finder"—the laboratory in Philadelphia with complete equipment right at hand for the most exhaustive and exacting tests—development work has kept to schedule for new breakers—with even higher ratings.

Long experience in research development, and the testing of switchgear equipment with more than 300,000 proof tests at previous G-E laboratories since 1921, form the extensive background for these new advances in designs for circuit breakers. Researched, designed, tested even to destruction under extreme power surges, they can be expected to meet the power demands of the future —whatever they may be. General Electric Company, Schenectady 5, N. Y. 872—3

You can put your confidence in—

GENERAL ELECTRIC

DIGGING HOLES for earth anchors with back hoe permitted operation under existing 115-kv line conductors. Back hoe required less operating height than more economical 36-in. pole hole digger.

ASSEMBLING TOWER on the ground adjacent to the anchors. Work was done primarily with groundmen. Electric impact wrenches were used, operated from portable gasoline-driven generator

Modern Methods Cut Costs for Steel Tower Line

J. A. RAWLS, Supervisor, Electrical Equipment & Transmission, Virginia Electric & Power Co., Richmond, Va.

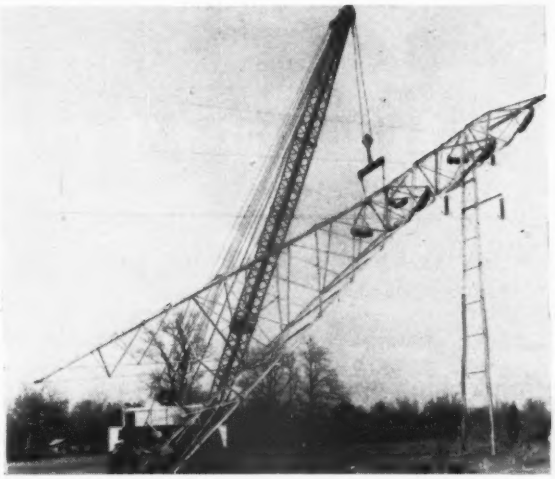
The use of a back hoe to install steel grillage anchors, assembling steel towers on the ground and then erecting them with a crane, effected a 10% saving in the recent construction of a 70-mile, 115-kv line by the Virginia Electric and Power Co. This saving is made when the method is compared with the cost of digging the anchor holes under an existing energized line with laborers and then erecting the towers with linemen. The saving was made despite the fact that towers had to be raised on overtime, when existing line could be removed from service.

This new line was needed to supplement an inadequate 1/0, single-circuit, 115-kv, "A"-frame, steel tower line between Petersburg, Hopewell and Suffock, Va.

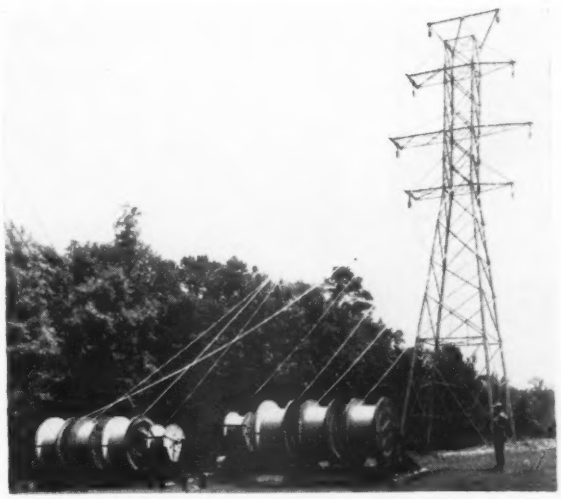
It had to be built quickly and, knowing from past experience the difficulty in securing right-of-way for a new line in a reasonable time, we decided to use the right-of-way of the old "A"-frame line that was not only inadequate in capacity but was also in bad physical condition, since the towers were of black iron. The right-of-way for the old line was 100 ft wide and would accommodate one single or one double-circuit steel tower line or one single-circuit "H"-frame line but not a double-circuit "H"-frame line. After making the necessary calculating board study, we decided that two circuits of 4/0 copper or copper equivalent conductors were required.

Standard steel towers were purchased, with minor modifications to meet our requirements. The steel towers selected have two overhead ground wires placed to give a shielding angle of 15 deg. Special steel grillage foundations were provided, except at a few very swampy locations, where large grillage placed deeper was required to make concrete pads unnecessary.

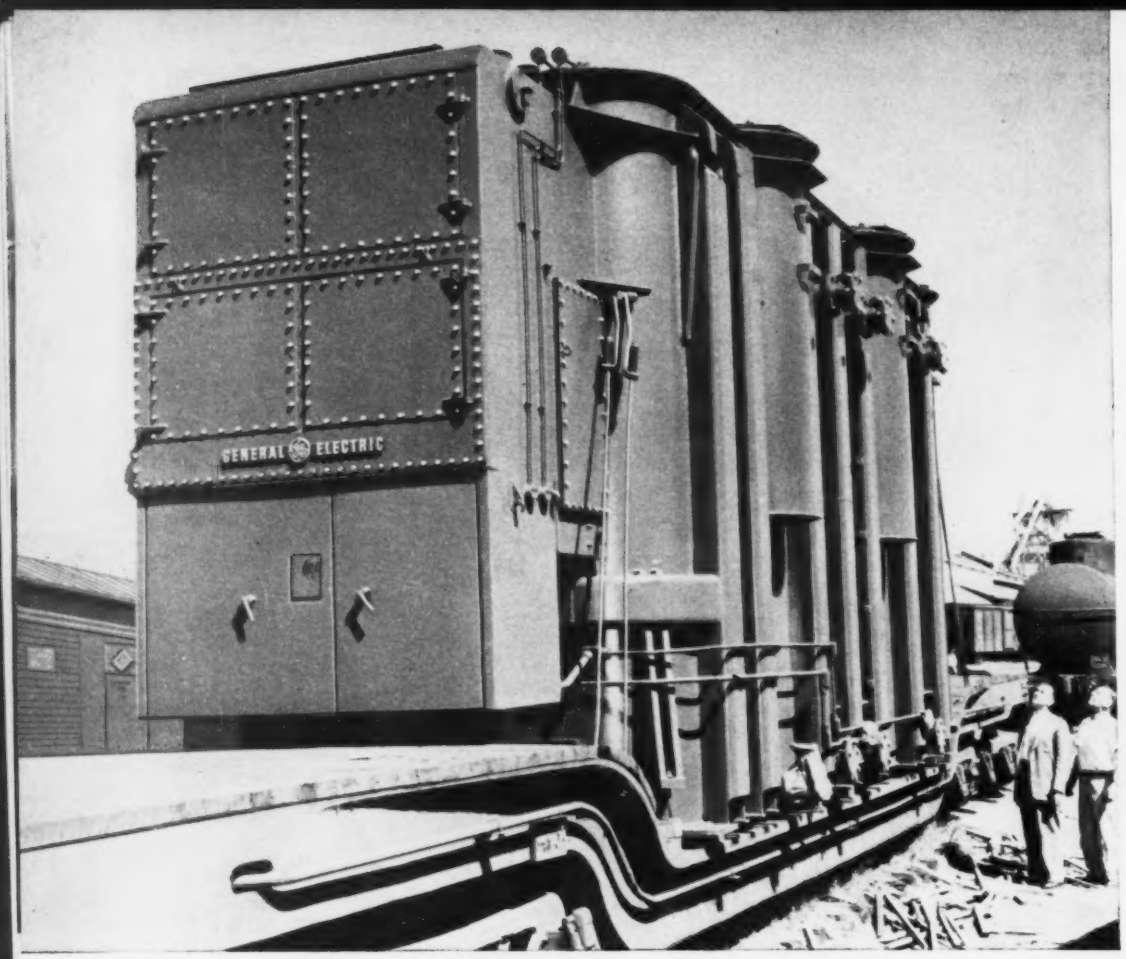
(*Continued on page* 144)



ERECTING TOWER after assembly. With mobile crane having 60-ft boom, 27 towers could be erected in 12-hr day. 86% of towers were erected with crane—remainder by gin pole at inaccessible spots



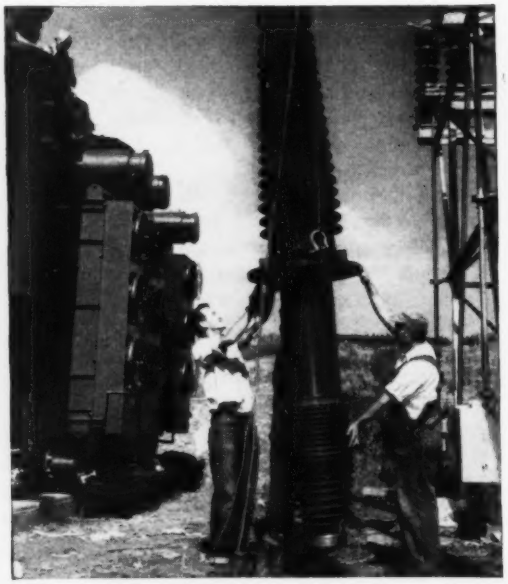
STRINGING CONDUCTORS—Six 336.4-M cir mils conductors and two 5/16-in. steel overhead ground wires were strung at one time



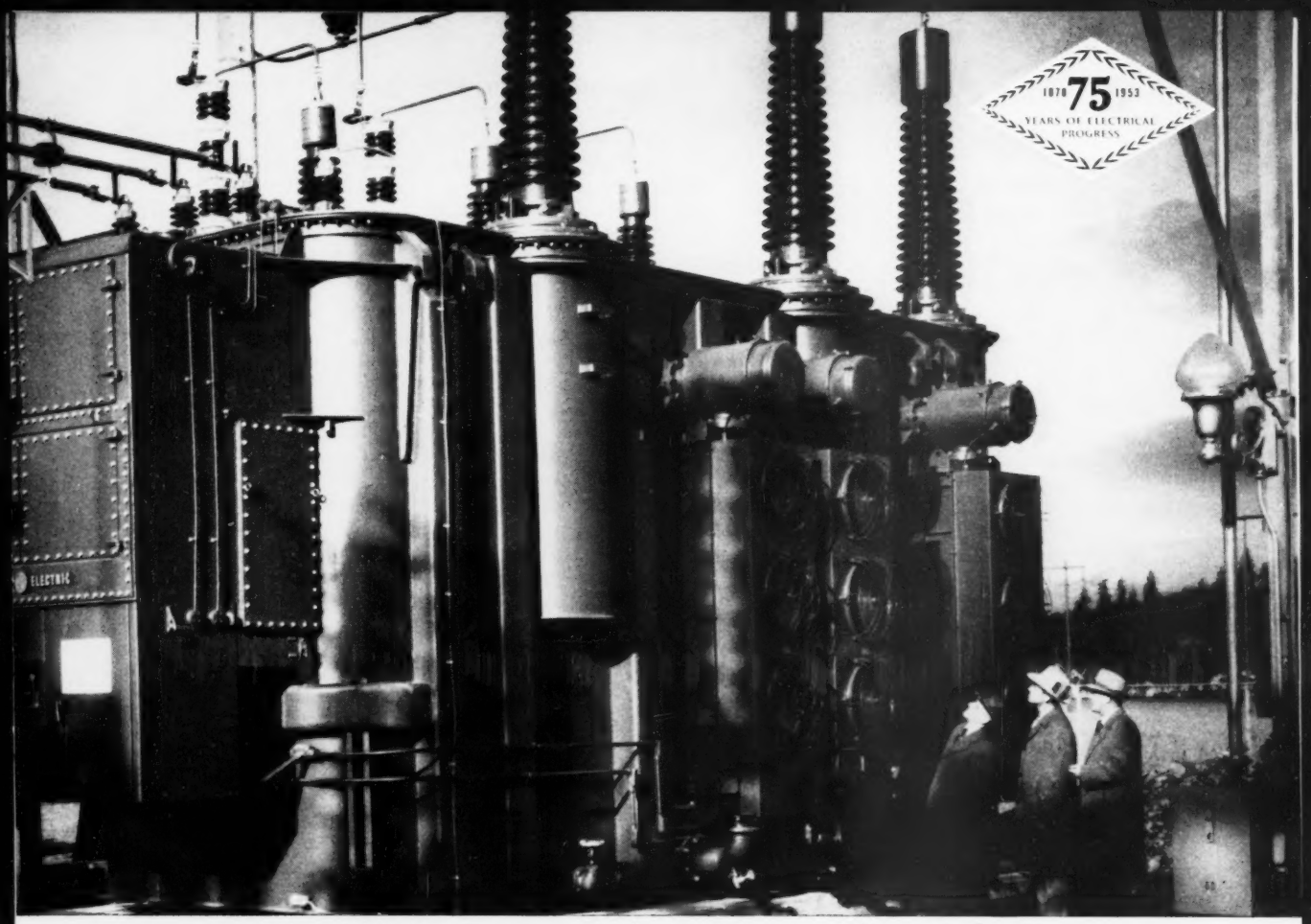
Upright shipment in one-piece tank means you can . . .

INSTALL G-E "CONCENTRIC LAYER"

TRUCK SERVES AS WINCH to transfer the unit from railroad car to trailer for the 2-mile trip to the foundation. Large cranes were eliminated, thus saving time and money.



BUSHINGS WERE INSTALLED just two days after unit was placed on foundation. One-piece tank construction contributed to speed of installation.



8 DAYS AFTER DELIVERY (one day was lost due to rain) this 125,000-kva, 220-kv—115-kv—13.2-kv autotransformer was ready to energize. Unit is cooled by directed flow of forced oil.

TRANSFORMERS FASTER . . . AT LESS COST

Washington Water Power energizes 125,000-kva G-E unit 8 days after delivery

Recently installed at the Beacon Substation of the Washington Water Power Company of Spokane, Washington, this General Electric autotransformer joins a 220-kv line, from the company's new Cabinet Gorge generating station, to an existing 115-kv system. This transformer, one of the largest autotransformers ever installed in the Pacific Northwest, is equipped with plus and minus 5% load-ratio-control. A second identical unit is now being installed and the two units will carry the entire output of Cabinet Gorge.

Reduced weight and dimensions resulting from the use of G-E "concentric layer" high-voltage windings permitted the autotransformer and the load-ratio-control series transformer to be fitted into a one-piece tank and shipped in an upright position.

In addition to their inherent compactness, "concentric layer" windings provide:

- High impulse strength due to uniform distribution of impulse voltages and the elimination of harmful oscillations.
- Effective inter-layer cooling—vertical ducts between layers permit unrestricted oil flow past each conductor.
- Greater mechanical strength because major magnetic forces are radial and well within the tensile strength of the conductor.

If you contemplate systems 161 kv or above in high-capacity ratings, it will pay you to review the data on "concentric layer" transformer design. Ask your G-E Apparatus Sales Representative for Bulletin GER-129, or write to Section 421-1, General Electric Company, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

Modern Methods Cut Costs

(*Continued from page* 141)

Since no steel tower line had been built on our system for over 25 years except for a few very short sections, we decided that labor saving methods had to be used to keep down the cost of the line. We were in hopes of digging the holes for the footing grillage with a 36-in. pole hole digger. However, since they had to be installed with the old line in service, this was impossible, as the shaft on the digger would come too close to the energized 115-kv conductors. As a result, we used a back hoe which did not require so much operating height.

This piece of equipment worked very well and the foundations for 65% of the structures were installed with it. The remaining 35% in swampy locations were dug by hand. The old line could not be removed from service except for short periods of time, hence, the problem of erecting the new towers was difficult. Good linemen for steel erection were hard to secure in this area, so we decided to completely assemble the steel towers on the ground adjacent to the anchors. This work was done primarily with groundmen. The nuts were tightened with electric impact wrenches powered by a portable gasoline engine driven generator.

With the towers assembled on the ground, a line outage was secured and the new towers were lifted by a mobile crane with a 60-ft boom. In this way, as many as 27 towers could be erected in a 12-hr day. Eighty-six percent of the towers were raised completely with the mobile crane and the other 14% were assembled in sections and raised by a gin pole at locations that were inaccessible to the crane.

Some of the 4¾-in. x 10-in. ball-and-socket insulators that had been in service over 30 years on the old "A" line were tested electrically and mechanically. Meeting the tests to our satisfaction, they were installed, nine per string on one new circuit, while eight new 5¾-in. x 10-in. units were used on the other circuit. The conductor clamps on the old line were malleable iron and, by replacing the bolts in some of them, they made a perfect fit for the 5/16-in. extra high strength steel overhead ground wires where goat heads were normally used.

To improve the lightning performance on this line, an 8-ft steel ground rod was driven under the grillage footing of each tower leg and connected to the grillage. When this did not reduce the resistance of each tower to 10 ohms, additional grounds were installed and/or a connection made to the footings of the old steel towers. This 70-mile double-circuit line has been in service through one lightning season and we have had two single-circuit and no double-circuit outages due to lightning. We anticipate that the lightning outages on this line will be higher than for a wood "H"-frame line with two overhead ground wires, but in any case the number of outages should not warrant spending additional money in an effort to reduce them.

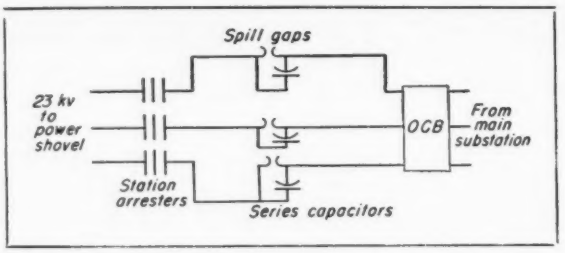
Series Shunt Capacitors Reduce Voltage Dips

TOM WREN, Supt of Meters and Relays, Sierra-Pacific Power Co, Reno, Nevada

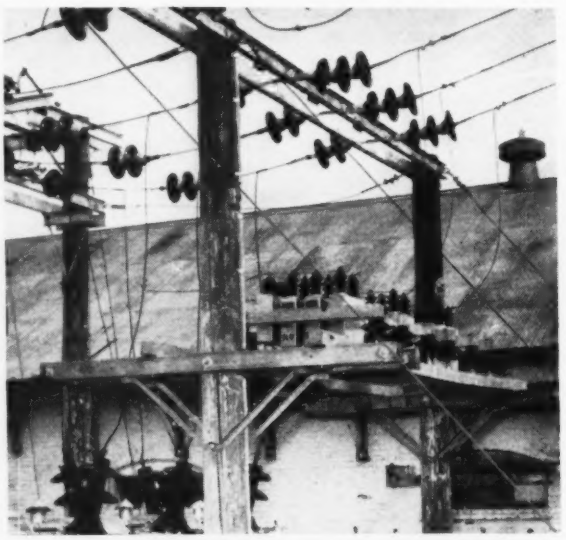
Shunt capacitors used in series on a three-phase 23-kv line have substantially reduced voltage dips due to starting and running load requirements of a 400-hp power shovel at a copper mine. Measured in terms of secondary voltage, installation has reduced starting dips from about 23% to 16%, even though starting load of the shovel can go as high as 1,300 kva. In addition, capacitors permit voltage to be maintained at about 117 v during digging operations, based on a nominal level of 125 v.

Installation consists of four 2.4-kv, 15-kva capacitors in parallel in each phase. Capacitors are located at the Virginia City substation which is fed by 22 miles of No. 1 copper line from Washoe substation, the major substation on Sierra-Pacific's system. Line to the power shovel consists of 39.5 miles of No. 4 copper conductor. Although enough capacitance was added to the line to balance out the inductive reactance, resistance of the line is sufficient to limit current to a safe value.

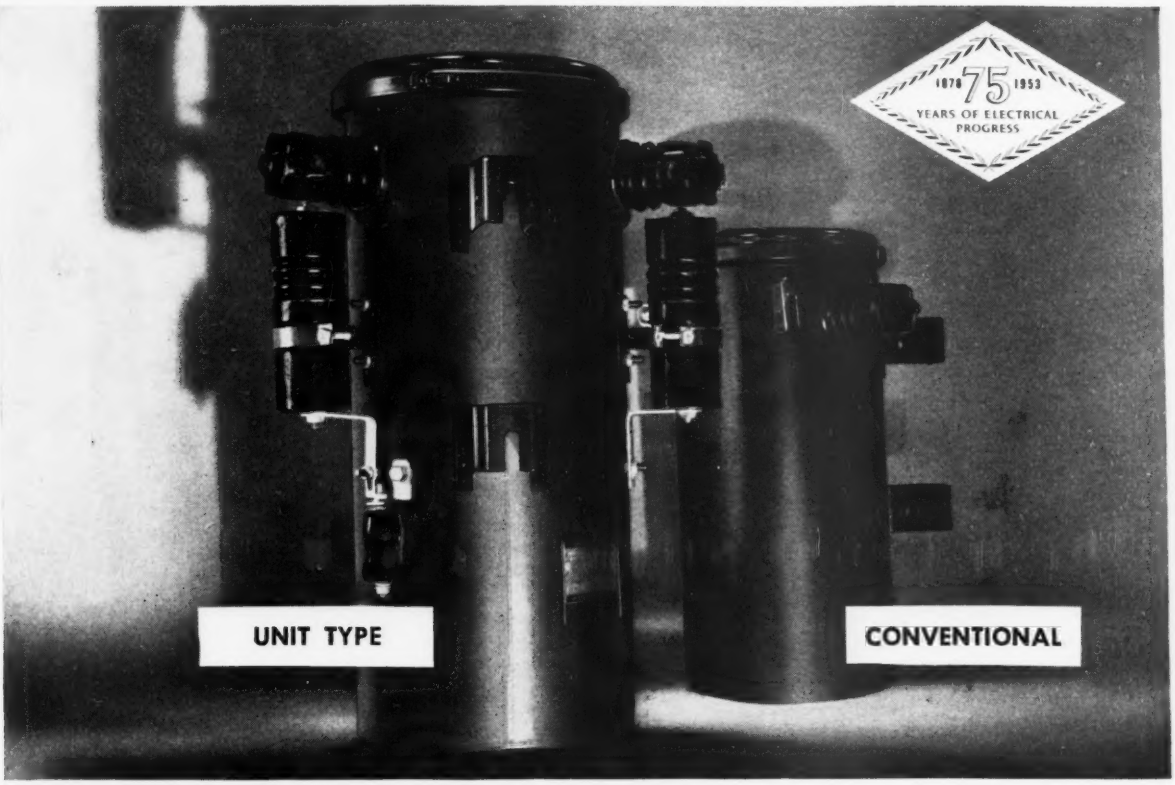
To protect the capacitors against line surges and fault currents, spill gaps have been added across units in each phase.

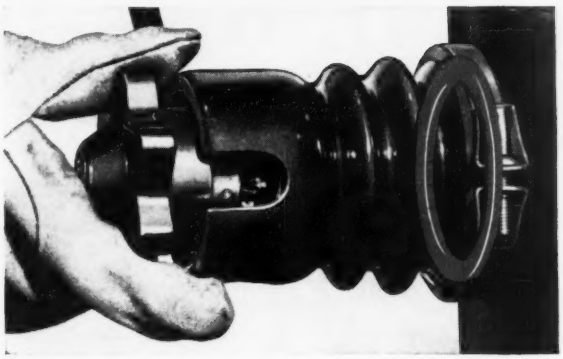


SERIES CAPACITORS in three-phase, 23-kv line consist of four 2.4-kv, 15-kva units in parallel in each phase. Gaps have been added

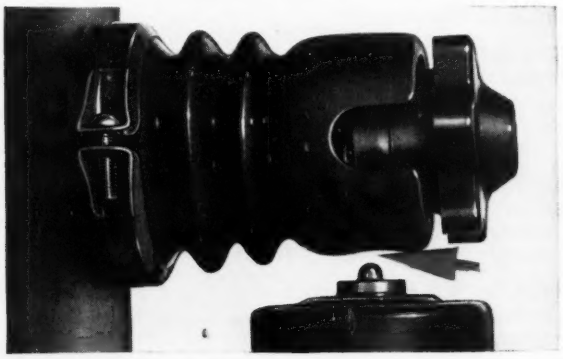


SURGE PROTECTION for series capacitor installation is provided by spill gap in each phase, in addition to station lightning arresters





NITRILE SEAL (in red) is used on all openings—including bushings—to prevent breathing. An extra feature is non-rustable stainless steel band and Everdur bolt which clamp bushing to tank.



EXTERNAL GAP on G-E unit-type transformer isolates arrester from high-voltage lead. The gap keeps arrester at ground potential and prevents line grounding in event of arrester damage.

Easier to Connect Better Protected

New tank-wall high-voltage bushings on General Electric transformers—both conventional and unit type—make them easier to install. They permit faster, safer connections—without tools. Cable can be brought in from either side of the bushings, tightened quickly.

EXTERNAL GAP PROTECTS. On G-E unit-type transformers, the Pellet arrester is externally gapped to the new tank-wall bushing. This gap keeps the arrester at ground potential and prevents line grounding in case of arrester damage. And because the Pellet arrester is of the valve type which can't be eroded by discharge, it offers protection that lasts indefinitely. It can be installed anywhere on your system regardless of short-circuit currents.

Many ratings of these Spirakore* transformers with tank-wall high-voltage bushings can be shipped directly from one of G.E.'s warehouses near your locality. They're available in ratings 5 kv and below, 100 kva and below. For more information get in touch with your nearest General Electric representative. General Electric Company, Schenectady 5, New York. 431-2

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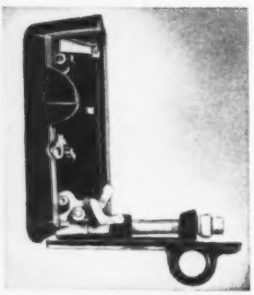
GENERAL ELECTRIC

1876 75 1953
YEARS OF ELECTRICAL PROGRESS

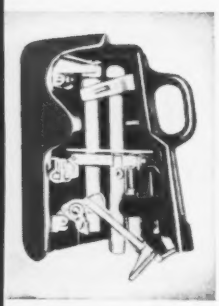
Four cutouts in one

by simply changing doors

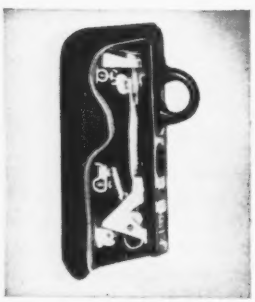
Indicating



Drop-out



Reclosing



Disconnect

A G-E FEATURE SINCE 1937! By stocking only three interchangeable doors which fit both 5.2- and 7.8-kv, 50-ampere housings, you get the 4 operating functions illustrated at the left. Available also in 100-ampere ratings, this unique flexibility reduces inventory and simplifies stocks.

INDICATING OR DROPOUT WITH A TWIST OF THE WRIST! A small wire yoke, easily inserted or removed, determines whether the fuseholder door "kicks out" at the bottom for visual indication, or drops open—either way giving positive evidence of a blown fuse.

RECLOSING DOOR AVOIDS UNNECESSARY SERVICE TRIP! The two-element reclosing door restores service within one second after a temporary fault blows the first fuse link. By saving a service trip, the two-shot cutout pays for itself the first time it operates!

FLEXIBLE DISCONNECT BLADE CAN'T GET LOST! It's fastened to the door—can't be misplaced. This disconnect blade doubles the continuous current rating of the cutout. When the blade is disconnected and the door closed, the flexible cable extends downward to indicate that the circuit is open.

WHAT'S MORE THE CUTOUT IS LIBERALLY DESIGNED —has high dielectric strength, uses silver-plated contacts, provides full-range interruption of fault currents, and is conservatively rated. All live parts are completely enclosed for maximum safety.

For complete information contact your G-E Apparatus sales representative, or write for Bulletin GEA-3448. General Electric Company, Schenectady 5, N. Y.

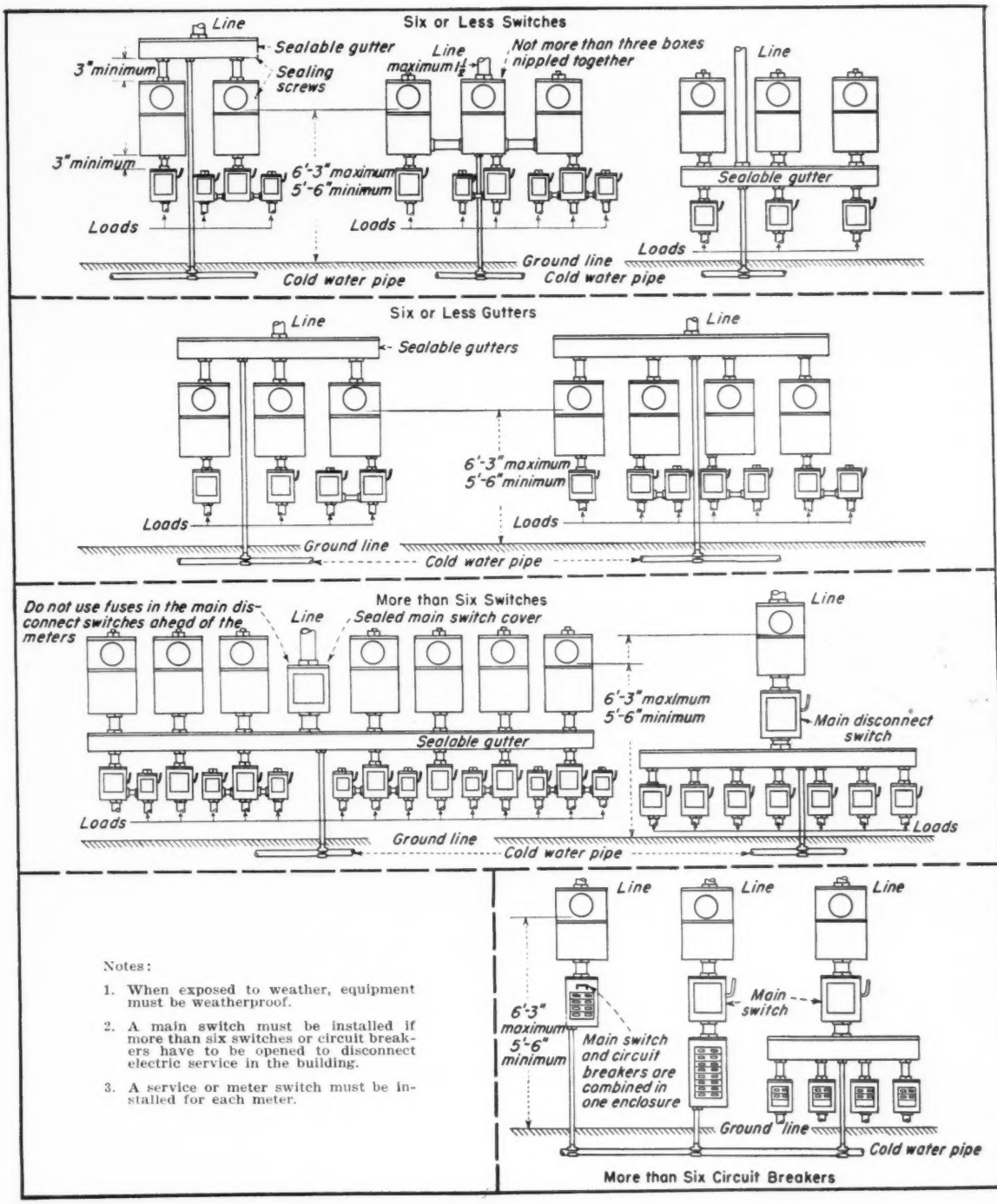
406-44

GENERAL ELECTRIC

Meter Grouping for Commercial Service

H. M. WILLIAMS, Electrical Inspector, California Electric Power Co, Riverside, Calif.

Typical installations of grouping meters for 120/240-v, single-phase service in one large building with several businesses or large installations with numerous divisions of load. Group arrangements are adapted from standards of California Electric Power Co and meet National Electric Code.



Notes:

1. When exposed to weather, equipment must be weatherproof.
2. A main switch must be installed if more than six switches or circuit breakers have to be opened to disconnect electric service in the building.
3. A service or meter switch must be installed for each meter.

Three-Pulley Block Has 25-In. Bending Radius

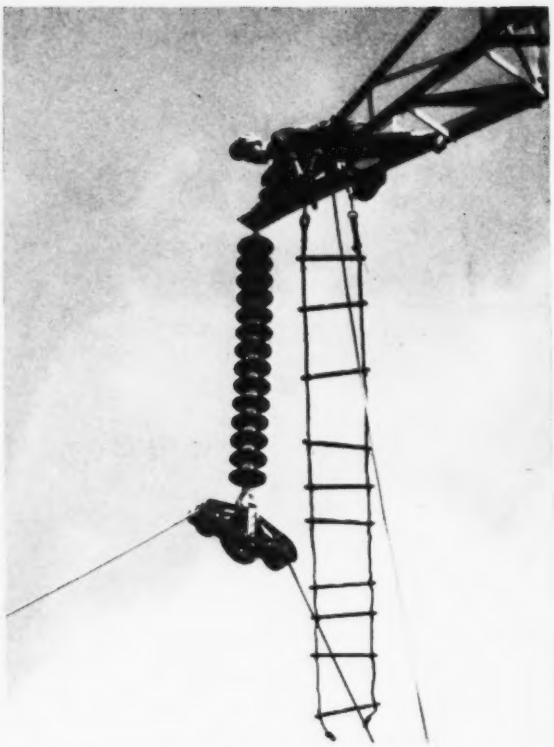
To facilitate construction of overhead transmission lines using 1,192,500-cir mil ACSR conductor, a cast magnesium alloy stringing block was developed by engineers of the Hydro-Electric Power Commission of Ontario. The block weighs only 65 lb and has a 14-in. diam sheave and an 8-in. diam guide sheave on each side of the larger wheel. This three-sheave arrangement simulates the top arc of a 51-in. diam circle and minimizes bending of the conductor splice. The latter is approximately 32-in. long and 2⅛-in. diam.

The 1,192,500-cir mil conductor weighs 1.5 lb per ft, reel lengths are approximately 2,500 ft, and the average span length being 1,000 ft means a splice every 2½ spans. Several reels of cable are strung through blocks and spliced before the conductor is pulled to tension. While the actual load on the block should never exceed the weight of one span of cable, about 2,000 lb, the unit was designed and tested for a 4,000-lb load. Actual tests with loads to 11,000 lb showed no apparent failure.

For ease in raising from the ground to the tower suspension arm, a sling eye is provided on each side of the stringing block. A rope or sling can be passed through one of the sling eyes to reduce the danger of the block falling.

A simple mechanism is provided for attaching the block to the suspension insulators on the tower. Fastened to each side frame is a steel strap with hinges at the top. Attached to these hinges is a yoke containing a ball socket which connects to the bottom ball of the insulator ring. This feature can be modified to fit insulators of the clevis and eye type.

The suspension attachment is opened by a special steel bar in one hinge, permitting the cable to be removed while the block is still attached to the insulator string. The hinge bar has a long slot to prevent it from opening accidentally.



THREE-SHEAVE BLOCK weighs only 65 lb, is suspended easily from insulators by linemen. Sling eyes on each side facilitate raising

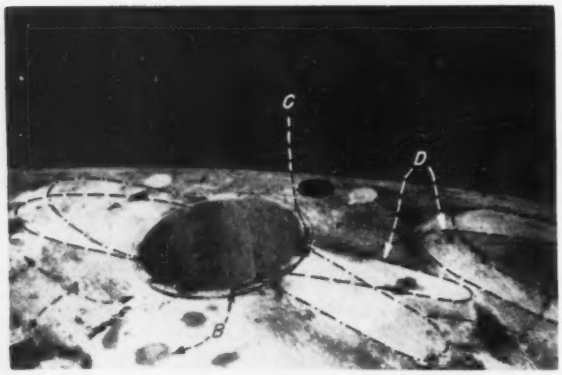


FIG 1—WEARING PLATE on curb plate. Note excessive cavitation (A) between gate position and runner, also projection of bearing insert and alloy bolt. Bearing insert has sheared pin (C) and turned approximately ¼ in. Note outline of wicket gates in open (E) and closed (D) positions. Bearing inserts and belts (B) are in good condition

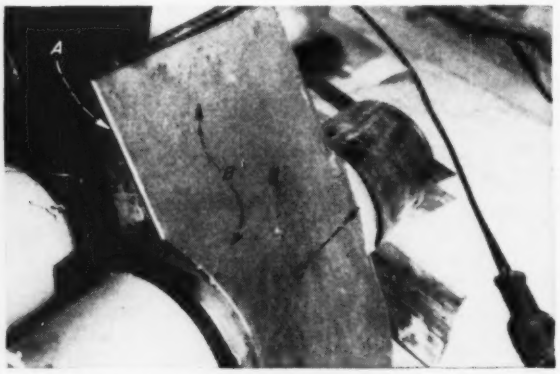


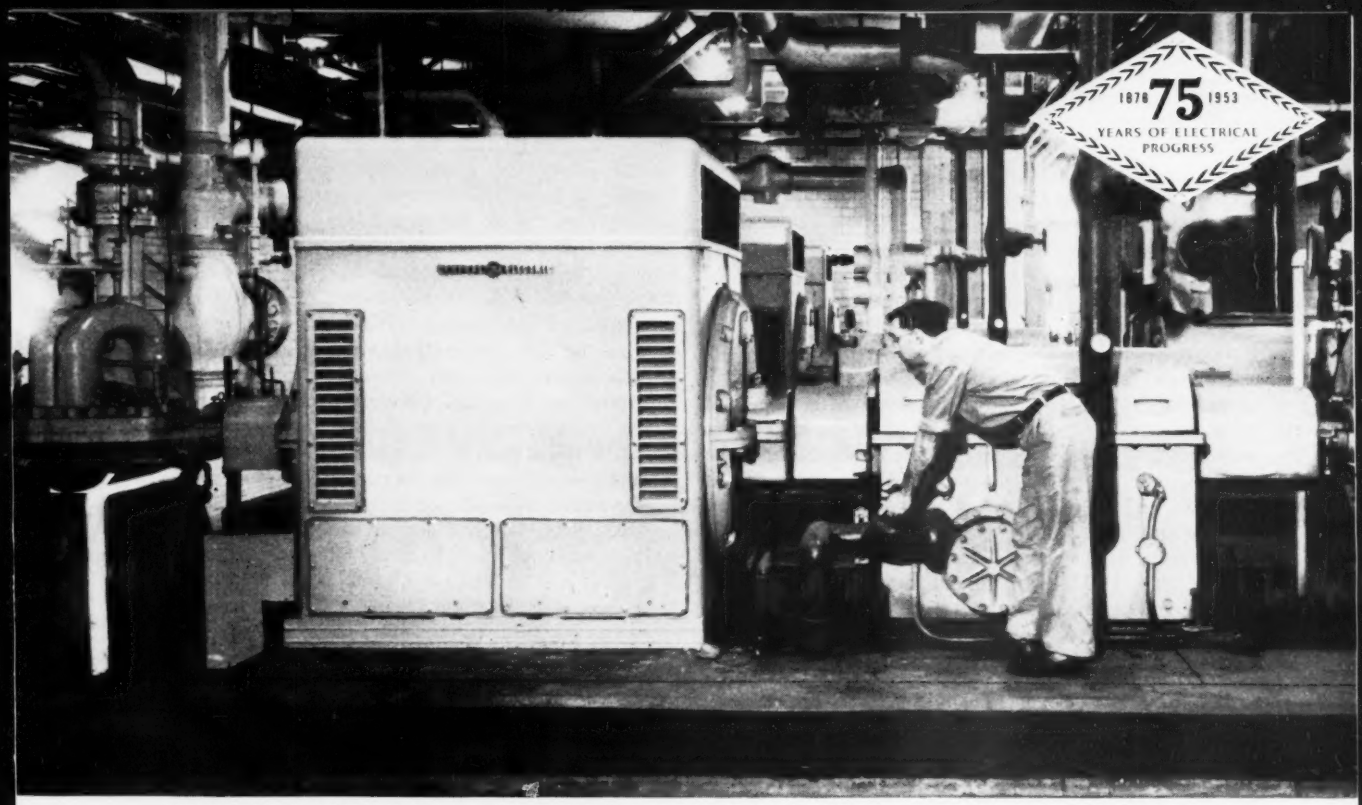
FIG 2—WICKET GATE'S FACE toward runner. Note the heavy cavitation (C) in fillet between the bottom stem and the gate blade. Also note the projection of stainless steel welding at the top and bottom of gates, pitted wicket gate face (B) toward runner and perfect condition of the welded stainless (A)

Stainless Steel Cuts Turbine Maintenance

H. H. GNUSE, JR, Vice President, Nantahala Power & Light Co, Franklin, N. C.

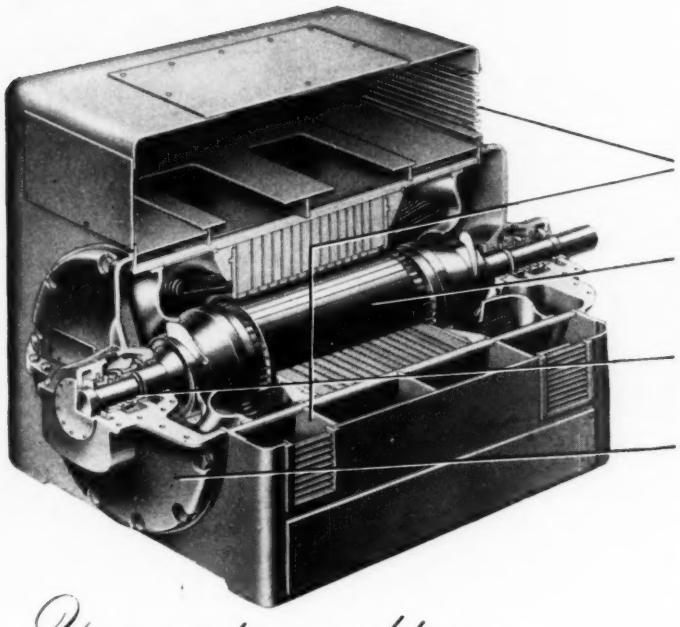
The maintenance and operating cost of the 60,000-hp, 925-ft head Francis turbine in the Nantahala plant of the Nantahala Power and Light Co has been reduced by a liberal application of stainless steel.

Seven and a half years' operation since this work was completed has failed to affect the appearance of the stain-



DETROIT EDISON RELIES ON 3 G-E BOILER FEED PUMP MOTORS IN THEIR MODERN CONNERS CREEK STATION BECAUSE . . .

New G-E Boiler Feed Pump Motors Are Custom-built for Power Stations



Here's a motor designed especially for boiler feed pump service. It's a revolutionary design . . . with modern styling . . . operates quietly . . . directs discharge air away from personnel . . . conserves valuable floor space in power stations.

UNIQUE VENTILATION SYSTEM permits closer parallel spacing of motors . . . prevents recirculation of heated discharge air . . . improves personnel comfort. Air entering sides is discharged high above endshield away from adjacent motors and personnel.

STREAMLINED ROTOR construction prevents "siren" effect—built-in air deflectors and large discharge chamber cut over-all noise level.

DUAL LUBRICATION SYSTEM combines the advantages of force-flood lubrication and self-lubricated oil rings . . . gives extra protection . . . assures long, reliable bearing life.

COMPLETE 360 DEGREE ENDSHIELD supports bearing from top as well as bottom . . . assures continuous, accurate bearing lineup. Both endshield halves are sturdy ribbed castings.

For more information contact your G-E representative or write for Bulletin GEA-5813 to General Electric Co., Section 753-2, Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

less steel. In most places the original tool marks are still visible on the stainless surface. The only places where additional work has been required have been areas on the runner buckets where the original welding was not applied. In such spots the old metal has been removed by chipping and stainless weld applied without removing the runner from the machine. On several of the additional areas which were subsequently welded, various compositions of stainless rod have been used and all have been satisfactory despite the fact that laboratory tests have shown a superiority of alloys in the composition of 17/7 or 18/8.

Two and a half years after this unit was placed in operation, an inspection revealed excessive erosion and cavitation in areas which were subjected to high water velocities or cavitation effects. These areas included the wearing plates above and below the wicket gates such as shown in Fig 1. (It will be noticed from this photograph that the curb plate which was originally made of SA 1045 carbon manganese steel and heat treated to a Birnell hardness of 200 to 235 had been cut away in areas directly beneath and behind the wicket gates, although the alloy bushing around the gate stem and the alloy screws which fastened the wearing plate to the curb ring were not appreciably affected.) Also, the forged steel surfaces of the wicket gates were badly eroded, whereas the stainless overlay on the top and bottom edges of the wicket gates as shown in Fig 2 were not affected. The brass inserts in the stationary seal rings and the hardened steel wearing rings on the runner were also found to be in bad condition. Cavitation had removed considerable metal from the non-overlapping backsides of the runner vanes and from the top 6 in. of the cast steel draft tube throat ring.

Although the cavitation and erosion had not progressed to a point which would endanger the safety of the unit, it was decided to repair the affected areas when the work could be done without wasting water and the improved efficiency would soon pay for the earlier repair work.

The repairs were effected by recessing the affected areas approximately ⅛ in. and coating with an overlay of 25/20 stainless welding rod and refinishing. This treatment was also applied to the seal rings, except that 13 chrome-stainless steel was used for the stationary seal ring inserts.

Cable Reel Dolly Cuts Labor 70%

E. S. GEIGER, Supt. of Distribution & Transmission, Tampa Electric Co, Tampa, Fla.

The relocation of existing underground cable with 100% reusability is made possible by this homemade cable reel dolly. A reduction of 70% in labor over the former hand pulling method is effected. Cable can be pulled out, reeled up and pulled in with the same operation.

The dolly was designed and built as a joint effort by the Distribution, Transmission and Garage Departments mostly from salvaged materials. Cost was approximately $700 for labor and materials. It was first used to remove abandoned street railway underground cable, but is also useful for overhead wire and aerial cable. A small gasoline engine with clutch attachment supplies the motive power on one dolly.

POWER PULLER salvages underground cables or overhead wires with 100% reusability. Cables can be pulled out, reeled up and pulled in (relocated) with same operation. A small gasoline engine with a clutch attachment supplies the motive power

Better Methods Double Storage Capacity

J. E. DUBBS Supervisor of Central Division Storerooms, Ohio Power Co, Canton, Ohio

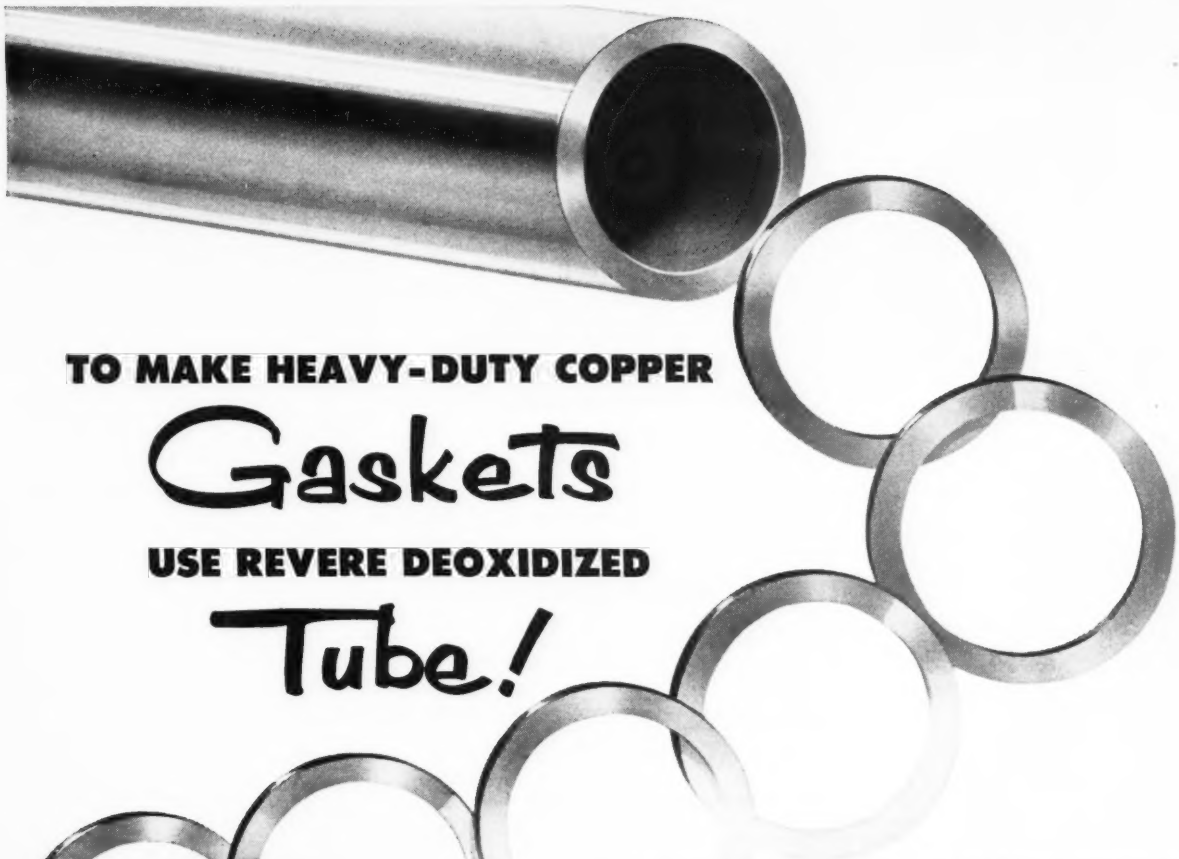
Storage capacity in the Canton yard has been more than doubled by different methods of storage, and the manpower required for handling the stock has been reduced to a minimum by using a fork-lift truck.

Storage of crossarms, distribution transformers, and cable reels called for attention to distinctive features of each item. The methods used require relatively little ground space, which is important when storage yards cannot be as extensive as desired. They simplify unloading and also make the stock readily accessible for loading on trucks or other shipment if stacks contain the same classification of stock.

When storing stock, here are some precautions to avoid damage and injuries to personnel.

1. Reels and crates should be inspected to ascertain that they will support not only their contents but loads on top of them.

2. When pyramiding stock, obviously the heaviest and broadest should be closest to the ground, and the



TO MAKE HEAVY-DUTY COPPER Gaskets USE REVERE DEOXIDIZED Tube!

Diesel Fuel Injection Pump, made by American Bosch Corp., Springfield, Mass., and gaskets made by cutting rings off 2" deoxidized copper tube.

• An important extra service rendered by Revere consists of collaboration in setting up specifications. This is valuable because there are many different Revere Metals, each with special characteristics. No one copper, for example, will serve to best advantage in every application. A case in point is the matter of copper gaskets for Diesel fuel injection pumps. Copper is of course an ideal metal for gaskets, and is widely used for that purpose. But for this special application, which copper and in what form? The pump is used on large engines for municipal generating plants. It weighs 186 pounds, and must produce the high pressure required to inject fuel near the top of the Diesel compression stroke. Naturally, the load is a pulsating one. American Bosch Corporation came to Revere with the problem. Our suggestion was that much scrap could be saved if the gaskets were made by cutting rings off copper tube, instead of stamping them from strip. This achieved a double purpose, since the tube is made of deoxidized copper, which is superior in this application to electrolytic. We are able to report that these recommendations proved successful. . . . This work was done by the Revere Technical Advisory Service. To get in touch with it, see the nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere.

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS

5 reasons for specifying RT&E TRANSFORMERS

5 HIGH IMPULSE LEVEL
Impulse level with built in safety factor considerably exceeds industry standards and is accomplished by—low layer insulation voltage stress—stepped back and graded overinsulation—space wound windings at coil ends—taps positioned in center of H.V. windings.

4 OIL FILLED PRIMARY BUSHINGS
Primary bushings are a wick-fed oil-filled type to eliminate corona and radio noise.

3 EXTERNAL TAP CHANGER
All tap changers are externally operated to avoid opening of unit—breaking of factory cover seals—contamination of oil from moisture and dirt—provides a greater convenience for tap changing and tap position identification in a matter of seconds. Unit remains sealed for longer life.

2 STANDARD 5 YEAR GUARANTEE
All RT&E transformers are guaranteed for 5 years from date of shipment from factory, free from defective workmanship and materials.

1 D. B. P. C. (inhibited oil)
All RT&E transformers are inhibited with D.B.P.C. to reduce oxidation —sludge—corrosion—acid formation and to increase transformer life.

SIZES
3 THRU 500 KVA
2400 TO 14,400 VOLTS
SINGLE & DOUBLE BUSHINGS

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632 N. 8TH ST. MILWAUKEE 3, WISCONSIN

RT&E Co.

BRANCH PLANT: WAUKESHA, WISCONSIN

FORK LIFT and vertical storage conserve space, aid availability and handling

lightest and narrowest ones on top.

3. Safe top loading of fork-lift trucks might be conspicuously labeled on them.

4. Fork trucks should not be moved around the yard with elevated load.

5. When inserting the fork under a load, attention should not be distracted from the operation.

If these precautions are taken, top-heavy loads or stacks can be avoided, stacked packages will not be toppled by crushing of lower units, damage will not be done to highly expensive equipment like cable and transformers, and personnel will not be endangered.

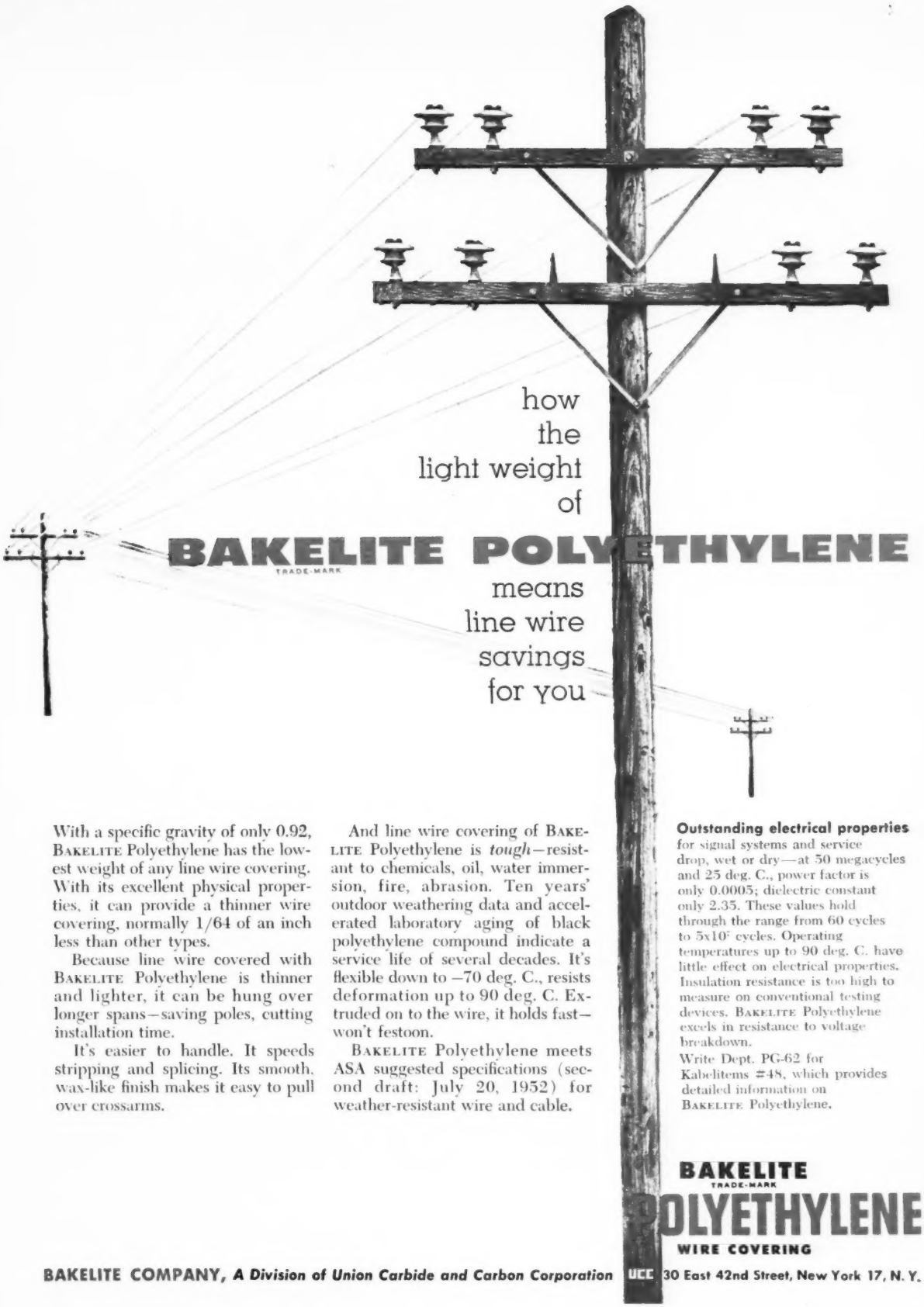
One-Man Car-Washer Does 10-Minute Job

Car washing has been simplified, costs cut and a better wash job made possible with an automatic washer, recently installed by Cincinnati Gas and Electric Co. The automatic washer is used for washing passenger cars and small trucks. Equipped with bearings, rollers and steel guide, the washer can be moved over a car with very little effort by the operator.

An electric motor-driven pump pumps 25 gal of water per minute at 100 psi. Pressure can be increased to 150 psi if desired.

The washer is pulled over the car using clear water the first trip and detergent on the return trip. The washer can be regulated for either a rich, heavy shampoo, or a light mixture. A hand mop is used if required by the

(*Continued on page* 156)



how
the
light weight
of

BAKELITE POLYETHYLENE
TRADE-MARK

means
line wire
savings
for you

With a specific gravity of only 0.92, BAKELITE Polyethylene has the lowest weight of any line wire covering. With its excellent physical properties, it can provide a thinner wire covering, normally 1/64 of an inch less than other types.

Because line wire covered with BAKELITE Polyethylene is thinner and lighter, it can be hung over longer spans—saving poles, cutting installation time.

It's easier to handle. It speeds stripping and splicing. Its smooth, wax-like finish makes it easy to pull over crossarms.

And line wire covering of BAKELITE Polyethylene is *tough*—resistant to chemicals, oil, water immersion, fire, abrasion. Ten years' outdoor weathering data and accelerated laboratory aging of black polyethylene compound indicate a service life of several decades. It's flexible down to −70 deg. C., resists deformation up to 90 deg. C. Extruded on to the wire, it holds fast—won't festoon.

BAKELITE Polyethylene meets ASA suggested specifications (second draft: July 20, 1952) for weather-resistant wire and cable.

Outstanding electrical properties for signal systems and service drop, wet or dry—at 50 megacycles and 25 deg. C., power factor is only 0.0005; dielectric constant only 2.35. These values hold through the range from 60 cycles to 5×10^5 cycles. Operating temperatures up to 90 deg. C. have little effect on electrical properties. Insulation resistance is too high to measure on conventional testing devices. BAKELITE Polyethylene excels in resistance to voltage breakdown.

Write Dept. PG-62 for Kabelitems #48, which provides detailed information on BAKELITE Polyethylene.

BAKELITE
TRADE-MARK
POLYETHYLENE
WIRE COVERING

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC **30 East 42nd Street, New York 17, N. Y.**

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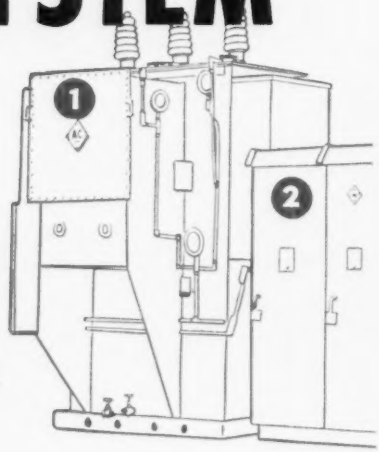
MULTI-CIRCUIT

Unit Substations

GROW WITH YOUR DISTRIBUTION SYSTEM

① By Double Ending
② Adding Feeders
③ Increasing Transformer Size



Here's How Allis-Chalmers Substation Design Eases Future System Growth Problems

YOU CAN PREDICT your entire system load at some future date easier than you can predict that of a specific substation. A new housing development, a new industry, a new shopping center—each can make a major change in the load on one substation without greatly affecting the entire system. That's why substation design must be *flexible!*

Easy Field Assembly Speeds Expansion

Allis-Chalmers unit substations not only meet your immediate needs, but are designed to grow with the areas into which they are installed. They are designed for easy addition of feeders . . . easy double ending . . . and easy application of larger capacity transformers.

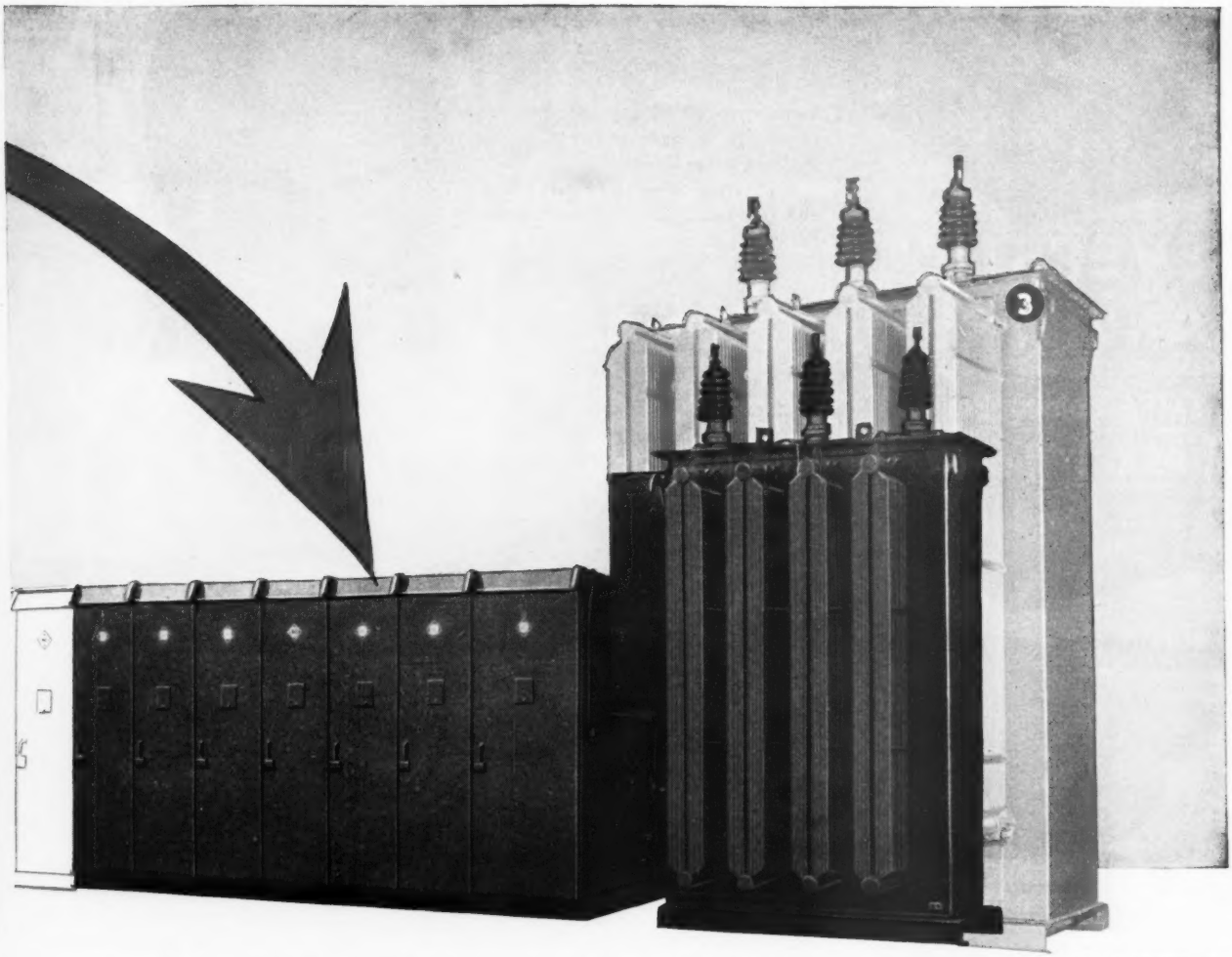
Allis-Chalmers Unit Substations are a convenient answer to the growing distribution problem . . . to the ever increasing demand for power and yet more power. They are simple to specify, neat and modern in appearance, and easy to expand.

You Save These Five Ways

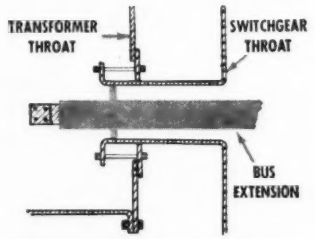
(1) Original equipment cost is low; (2) compact construction reduces space requirements and real estate costs; (3) pre-wired unit design speeds installation; (4) maintenance is quick and economical because of improved accessibility; and (5) you purchase only the equipment you need *now*, deferring additional expenses until load growth demands the expenditure.

For the full story on what Allis-Chalmers Unit Substations can mean in your distribution system, call your nearby A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3585

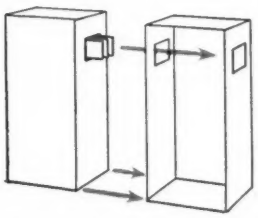
ALLIS-



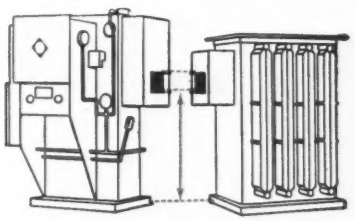
MCS Substations are Expandable These 3 Ways



1 **DOUBLE ENDING** is easy. Throat openings of transformer and switchgear are at exactly the same height. Bus connectors and transformer throat are flexible enough to permit realistic tolerances in concrete base construction. Silver-plated, pre-drilled bus extensions bolt together, are tape covered to speed field assembly.



2 **FEEDER UNITS** are easy to add because they are jig built. Each feeder cubicle is exactly like every other one. Bus extension openings, control wiring openings — even small screw holes — are precut in jigs for perfect alignment. This uniform construction, plus two sides on every cubicle, makes field assembly easy.



3 **A HIGHER CAPACITY TRANSFORMER** — within the limits of breaker size and bus capacity — can easily replace the installed transformer. Standardized throat height on all A-C substation transformers, regardless of rating, permits one transformer to replace another without cutting or reforming the throat or bus.

CHALMERS

A-C ALLIS CHALMERS

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all others. Available two-way, three-way, four-way, and cone types. Write for facts.

AN EXCLUSIVE
EVERSTICK
FEATURE
Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO.
Manufacturer of "THE ANCHOR OF MERIT"
FAIRFIELD, IOWA

Car Washer

(*Continued from page* 152)

amount of dirt on the car. Then another trip is made with the washer, this time with clear water.

An average of 12 to 18 gal of water and 10 ounces of detergent is required per car. One man needs only 5 to 10 min to wash a car.

HEAVY OR LIGHT WASH, as needed, is set by operator who moves adjustable machine easily over the car

RINGS spaced at 3-ft intervals prevent sagging onto energized circuit during stringing

Wire Stringing Method Solves Problems

To solve the problem of stringing wire over energized lines, the Bayfield Electric Cooperative of Iron River, Wisconsin developed a unique but simple method. A line is tied to the top of one pole of the crossing span and threaded through 3-in. malleable iron rings that are linked together with 3-ft lengths of another line.

The first line is then passed over the energized circuit, pulled fairly tight and made fast to the top of the second crossing span pole. On each of the malleable iron rings is an ordinary harness snap and the end of the conductor to be strung over the energized circuit is tied to the snap on the first ring. The second line with the rings fastened at 3-ft intervals is passed over the energized circuit. As this line is pulled across the span the rings slide along the line that has been made tight to prevent the conductor from sagging onto the energized circuit. The new wire is snapped into the harness snap on each ring as the job progresses. Since the rings are kept at not more than 3-ft spacing the wire cannot sag.

HARNESS SNAPS make threading easy

HI-TENSION NEWS *Junior*

WE Can't Add Anything to this Performance Story

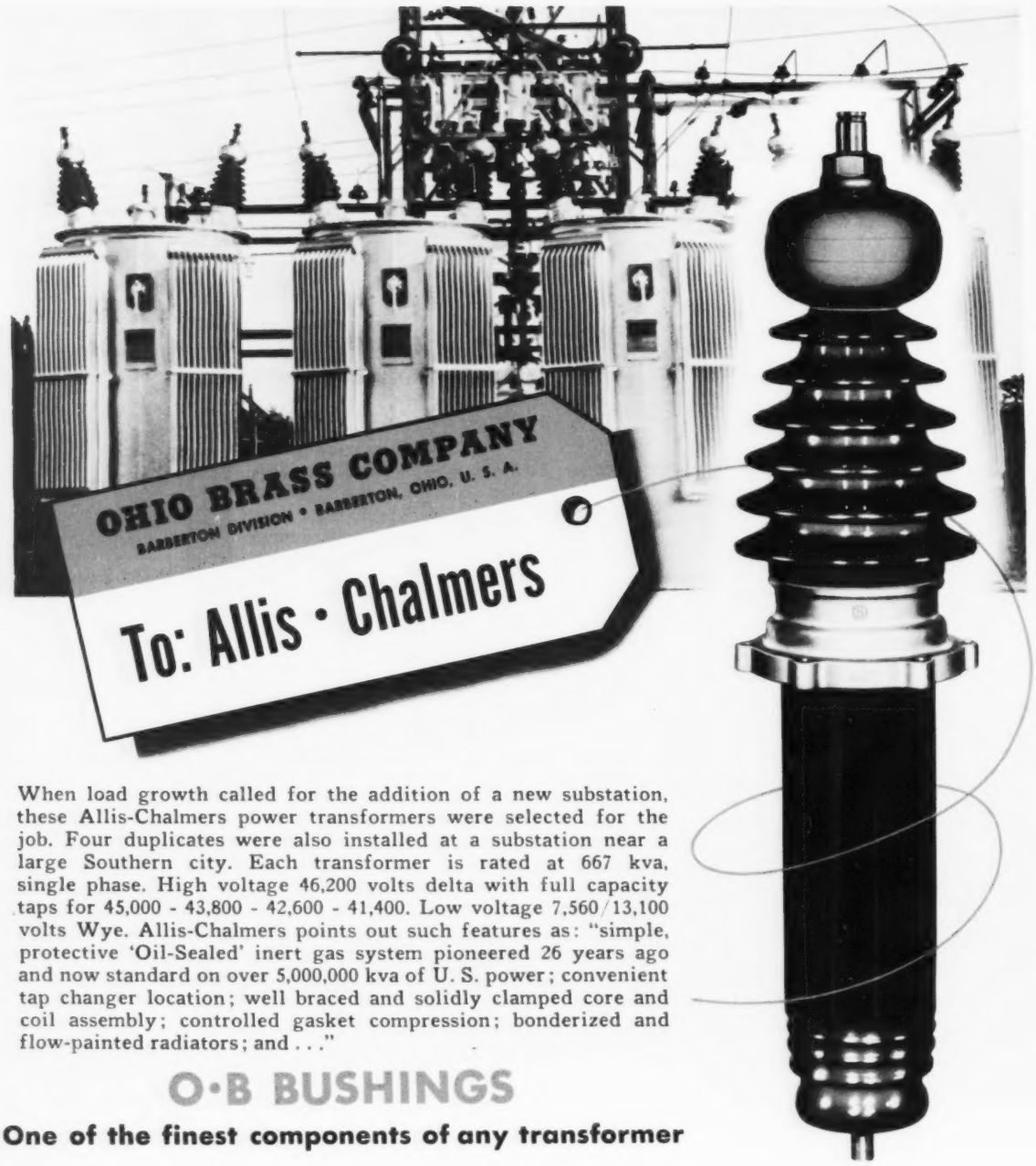
Major blocks of power for a heavy industrial section of the Midwest have flowed over this 132-kv line for the past 25 years. Since this 45-mile section was built, its owners have expanded transmission at this voltage in the order of ten times -- all on O-B suspension insulators . . . Twenty - five years' first-hand experience, coupled with repeated construction programs, all with the same make of insulator, logically point to just one conclusion: complete satisfaction with insulator performance, based on the power company's own recorded facts . . . Nothing *we* might say could supply any *better* reason to make O-B your choice of insulators.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

(B)

HI-TENSION NEWS *Junior*



When load growth called for the addition of a new substation, these Allis-Chalmers power transformers were selected for the job. Four duplicates were also installed at a substation near a large Southern city. Each transformer is rated at 667 kva, single phase. High voltage 46,200 volts delta with full capacity taps for 45,000 - 43,800 - 42,600 - 41,400. Low voltage 7,560/13,100 volts Wye. Allis-Chalmers points out such features as: "simple, protective 'Oil-Sealed' inert gas system pioneered 26 years ago and now standard on over 5,000,000 kva of U. S. power; convenient tap changer location; well braced and solidly clamped core and coil assembly; controlled gasket compression; bonderized and flow-painted radiators; and . . ."

O-B BUSHINGS

One of the finest components of any transformer

For the Bargain Hunter

You can specify size, strength, insulation level; practically everything, in fact, when you buy a station insulator. Does this mean all are just alike? . . . It would if you could add *performance* to your specifications, but the ability to live a long, healthy life is put in by the insulator manufacturer and constitutes the big difference . . . Many thousand O-B station insulators have proved themselves to be bargains by staying wholly serviceable well beyond 30 years, with the end nowhere in sight . . . With this big difference in performance, O-B station insulators are the choice of smart bargain-hunters.

Why O-B Pintypes Will Take You Through a Storm

Unless you could be uncomfortably perched on a pole-top during a thunderstorm, you might never see a sight like this . . . With leads so short that the specimen is actually within the impulse generator, in order to reduce time-consuming inductance, this Number 38270 pintype is undergoing a test "shot" in the O-B High-Voltage Laboratory. Even specialized laboratory measuring equipment is challenged to record the high rates of voltage rise, the order of 8,000,000 to 10,000,000 volts per micro-second that are applied in this design test. Flashover occurred at approximately 850,000 volts. Time to flash over, .08 to .10 micro-second. This is lightning! . . . All O-B pintypes have undergone thorough lightning research. All have been made to withstand such abuse. All can be relied upon to be intact after lightning exposure . . . Look as you will, there's nothing in outward appearances that will tell you this. Examination won't reveal which insulator will take a lightning stroke, and which will not. But when you see the "O-B" trade mark, you *know*. It's an easy way to specify and buy pintype insulators you can rely upon.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

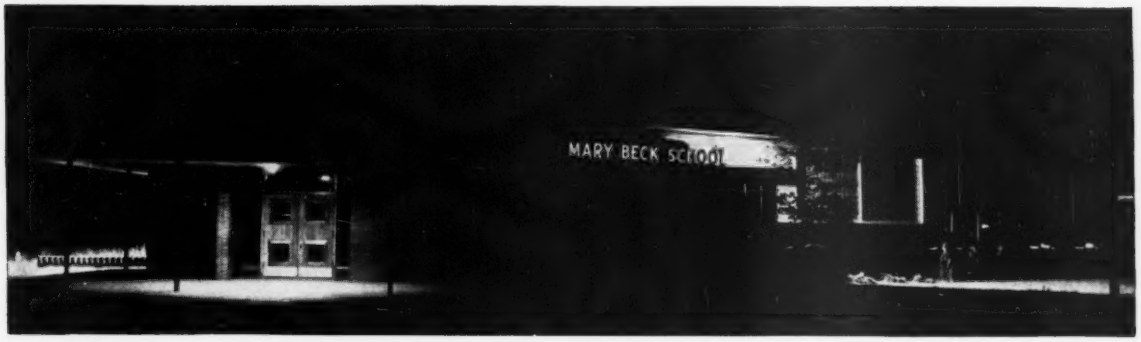
Trouble Savers ...STARTING THE DAY THEY GO UP!

It's one thing to tinker with small parts when you have bare hands, but it's "something else again" to do it with a pair of heavy insulated gloves. That's why linemen like O-B Universal Strain Clamps. Even this smallest model is handy to work. Nothing comes apart. You merely loosen the generous-sized nut, open the keeperpiece, insert the cable, and tighten. You're not dropping things off a pole-top or dealing with parts too small for stiff gloves to handle . . . Snubbing action of the clamp holds the cable at full working loads without slip . . . Cable blends away from the clamp body and eliminates any sharp point of mechanical relief that can cause crystallization in the conductor material . . . A lot of good high voltage know-how has gone into this low voltage O-B clamp. Specify O-B Universals on your primary feeders and save a lot of trouble, starting the day they go up!

Ohio Brass

MANSFIELD, OHIO, U.S.A.

4215-HR



Vandalism is shut out as . . .

. . . Flood Lighting Protects Schools

H. W. ROSENBERGER, Indiana & Michigan Electric Co, Elkhart, Ind.

Youthful vandalism is a problem that confronts school authorities everywhere. In Elkhart, Ind., it was decided to do something about it in a preventive way. Protective lighting was installed in three schools to see how effective it would be. A year's experience showed that it was effective; no property damage at any of the three. Now all 16 of the public schools will be so protected.

The installation pictured consists of 1200 w of flood lighting, time clock controlled. Other installations will be larger, the load for all schools amounting to about 35 kw. It is not a large load, but it is on the year around, 6 to 8 hours per night. It helps the usually poor load factor of school load and will use nearly 90,000 kwhr per year.

Caution Advised In Estimating House Heating

C. W. CHEATHAM, Alabama Power Co, Birmingham, Ala.

Further evidence* that "Kwhr per cubic foot" is not a practical index of electricity requirement for heating a house comes from data collected by the Alabama Power Co. The record covers 12 houses through the 1952 heating season. The houses are located in three climatic zones of Alabama, five in the south, four in the central, and three in the north with annual average degree days of 1500, 2900, and 3200, respectively.

As shown in the tabulated data, the variation in kwhr per cubic foot is much greater than that in kwhr per kw of design heating load. In the former, the range is from 0.61 to 3.09 kwhr, over 400%; in the latter the range is only 88%, from 579 to 1092 kwhr. Thus, kwhr per kw is the better basis for estimate of heating requirement.

In the Carroll and Nimphius article referred to in the footnote, an overall average figure of 0.335 kwhr per BTU per hour heat loss is given for ten houses in Westchester County, New York, through two heating seasons, with 5900 degree days annual average. This figure can be compared with the overall average of the 12 houses in the Alabama record. The Westchester houses show an average energy usage of 0.225 kwhr per kw per degree day. The average of degree days for the 12

Electric Heating Load and Kwhr Use In Alabama

House	Avg. Annual Degree Days	Cu. Ft. of Heated Space	Kw. of Design Heating Load	Watts Heat Loss Per Cu. Ft.	Heating Kwhr Per Season		
					Total	Per Cu. Ft. of Heated Space	Per Kw of Heating Load
1	1,500	9,520	12.8	1.34	7,650	0.80	598
2	1,500	11,240	14.4	1.28	9,490	0.84	659
3	1,500	12,980	13.6	1.05	7,870	0.61	579
4	1,500	14,000	12.4	0.89	8,600	0.61	694
5	1,500	16,350	18.7	1.14	11,300	0.69	604
Avg. 1–5	1,500	12,820	14.4	1.12	8,980	0.70	625
6	2,900	8,330	12.1	1.45	10,250	1.23	847
7	2,900	9,470	11.7	1.24	10,990	1.16	939
8	2,900	9,670	9.1	0.94	7,440	0.77	818
9	2,900	16,950	17.3	1.02	18,900	1.12	1,092
Avg. 6–9	2,900	11,050	12.6	1.14	11,900	1.08	948
10	3,200	6,090	18.8	3.09	18,800	3.09	1,000
11	3,200	6,560	10.4	1.59	10,120	1.54	973
12	3,200	12,650	16.2	1.28	15,600	1.23	963
Avg. 10–12	3,200	8,430	15.1	1.79	14,840	1.76	980
Avg. 1–12	.....	**11,150**	**14.0**	**1.26**	**11,420**	**1.02**	**818**

Note: In order that accurate comparisons could be made, the figures contained in the above table on kwhr use per heating season have been adjusted to the average heating degree days per season base of the climatic zone in which the customer was located. A wide variety of construction and insulation conditions were involved in the 12 houses included in this study.

* "Consolidated Edison Checks Up On House Heating", by A. L. Carroll and B. J. Nimphius, Electrical World, May 5, 1952.

Alabama houses is 2382. Dividing this into 818, the average figure of kwhr per kw, gives 0.343 kwhr per kw per degree day. The large difference between 0.225 and 0.343 kwhr indicates that while kwhr against heat loss is a better basis than kwhr against cu ft for estimate of electricity requirement, it also must be used cautiously.

National Range Promotion Planned for April and May

"Women Who Know . . . Cook Electrically." This is the slogan for an industry-wide range promotion planned jointly by the National Association of Electrical Manufacturers and the Edison Electric Institute for April and May. The slogan will be made available, through the Institute, to manufacturers, electric utilities, distributors and dealers so that all may participate.

The slogan will be offered in the form of wall posters and window strips, also in glossy prints from which reproductions can be made for advertising logotypes, truck posters, strips for outdoor poster boards, for letterhead and bill imprints, and in local television. Provisions are being made to have this slogan available for use in postage-meter imprints. "Spot" stickers will be available, scotch-backed so that they may be attached to electric ranges on display. Other available material will include booklets, a window display piece, a 27-minute full-color movie, and a cook book featuring recipes of famous movie stars.

Electric range dealers everywhere are urged to make plans for tie-ins with this promotion. Full details may be had through their local factory branches, distributors, or electric light and power companies.

EEI Offers Commercial Salesmen's Aid

"Application of Electrical Equipment in Commercial Establishments", a handbook designed to help the commercial salesmen make "on-the-spot" recommendations and estimates in preliminary form has been made available by Edison Electric Institute. Prepared by the Market Development and Electrical Applications Committee of EEI, the handbook consists of six sections containing basic data on the following subjects—classifications of business, commercial air conditioning, commercial ventilation, commercial water heating, commercial cooking, and commercial lighting.

Single copies of the publication are available from the Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y. at $1 per copy for EEI members and $2.50 per copy for non-members.

Estimated Number of Subscriber Families With Electricity and Owning Specified Electrical Appliances

	1945	1949	1952
Number of readers	950,000	1,084,000	1,196,000
Percentage reader homes electrified	61.6	69.6	89.5
Number of reader homes electrified	585,900	754,100	1,071,800
Percentage owning:			
Range	11.2	19	42.6
Television set	N. I.	N. I.	8.6
Refrigerator	62.4	73.6	94.0
Home freezer	N. I.	11.4	26.0
Automatic washer	N. I.	15.3	24.3
Conventional washer	44.5	65.0	58.0
Toaster	20.9	32.8	36.8
Food mixer	7.6	17.8	31.2
Coffee maker	7.3	17.2	30.3
Churn	9.3	22.8	28.4
Iron	61.5	92.0	96.8
Room fan	20.0	41.7	48.7
Attic fan	N. I.	4.0	5.1
Room heater	.4	15.2	13.4
Air cooling unit	N. I.	N. I.	1.9
Vacuum cleaner	20.0	26.6	38.8
Dishwasher	N. I.	.7	2.8

N. I.—"Not included"

Rural Market Rich One, Survey Shows

The rural South is the richest market available to the nation's appliance and farm equipment manufacturers.

So concludes "The Progressive Farmer" magazine, which has released figures on a continuing study among its subscribers.

The South contains 46%—more than 2.14 million—of the nation's electrified farms and consistently buys more major appliances per 1,000 electric customers than any other region, says "Progressive Farmer."

Survey findings are summarized in a folder giving number of electrified farms by states and regions, and ownership of appliances by years (see accompanying table). A companion folder gives latest census figures on number of farms, mechanical equipment, and electrification by counties and states. Both are available from the magazine's Market Research Department, Birmingham 2, Ala.

Appliance Trade-In's

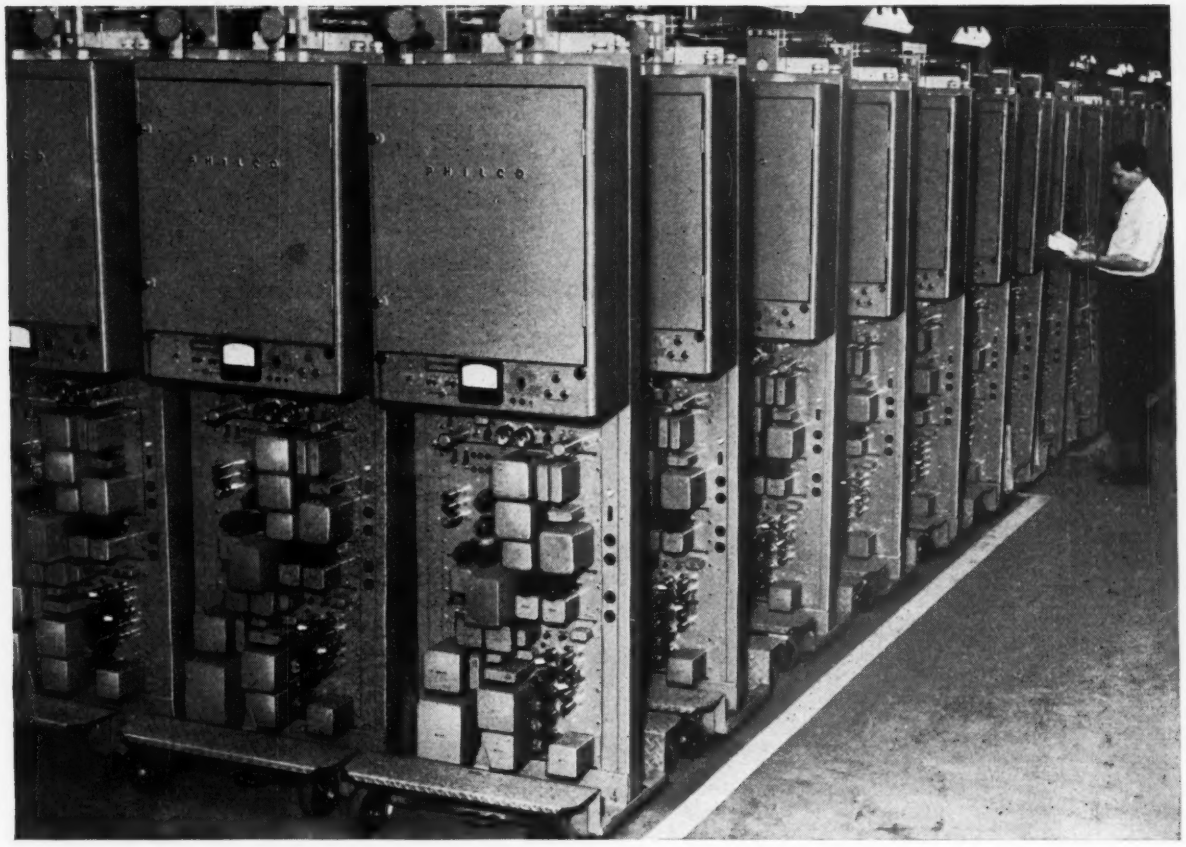
The 1953 edition of the National Appliance Trade-In Guide is now being distributed. It features suggested trade-in values on over 9,000 items from more than 80 manufacturers.

The guide is available from National Appliance Trade-In Guide Co, 2132 Fordem Avenue, Madison 1, Wisconsin.

Year-Round Air Conditioner Ready Soon

Combining gas-fired, forced-air heating with refrigeration for cooling and dehumidification, a year-round air conditioner by Frigidaire will be available in limited quantities in the second quarter of this year. In an earlier release, a reference to this new product was misunderstood by Electrical World and an item was printed December 8 erroneously stating the Frigidaire would bring out a heat pump in 1953.

The new unit will be offered in 3- and 5-ton capacities, both designed to be installed in small closet-type enclosures, basements and utility rooms. The smaller unit is 70 in. high, 40 in. wide and 34½ in. deep. The larger has the same dimensions except for width, which is 60½ in.



PHILCO IS THE WORLD'S LEADING MANUFACTURER OF MICROWAVE EQUIPMENT

Philco leads the world in mass production of quality microwave equipment to meet modern industry's demands for relay systems of the highest reliability and performance.

Philco microwave components meet most JAN (Joint Army-Navy) specifications without any changes in circuitry, thereby permitting other users of microwave communications equipment to have the built-in reliability required by the Armed Forces. That is why commercial users of Philco microwave equipment include such famous names as American Telephone & Telegraph Co., Santa Fe Railway System, Bonneville Power Administration, Platte Pipeline Company and many others.

Where quality and reliability are important, look to Philco . . . world's leading manufacturer of microwave equipment!

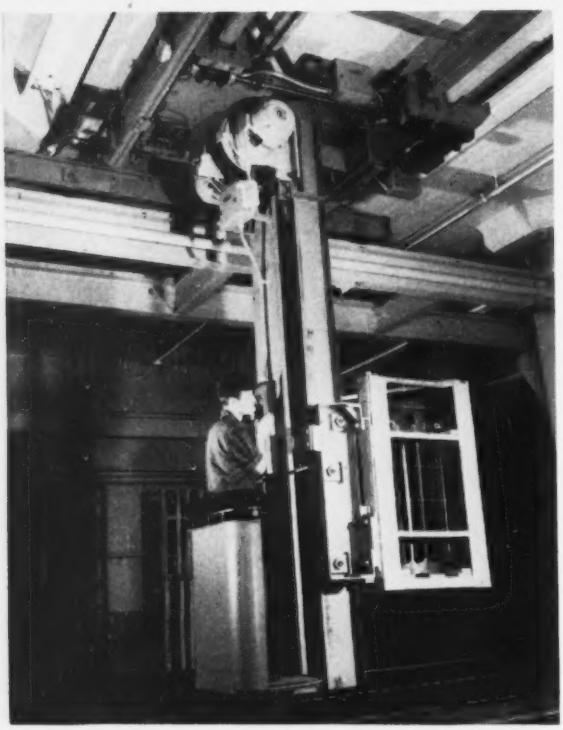
For complete information write to Department EW

PHILCO Foremost for QUALITY the World Over

PHILCO CORPORATION

GOVERNMENT & INDUSTRIAL DIVISION

PHILADELPHIA 44, PA.

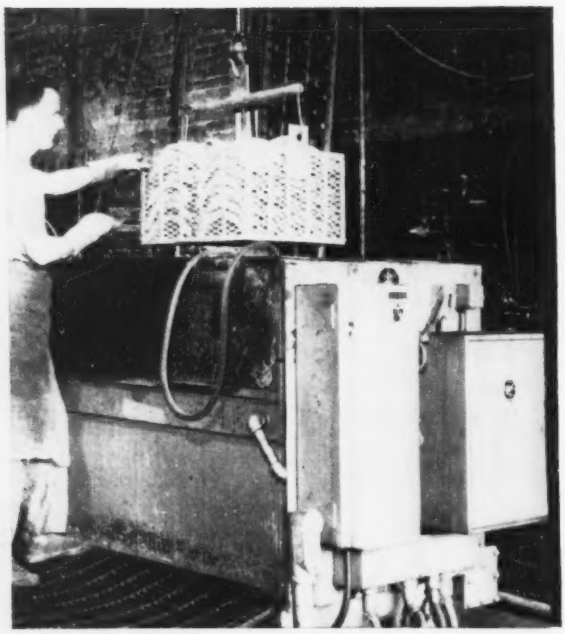


FLEXIBLE CRANE replaces fork truck handling transformers in narrow space. Unit enlarged storage space available in this plant section by 2,500 sq ft. Picture shows 50-kva transformer being handled

Crane Unit Works in Eight Directions in 6-ft Aisle

Increased flexibility in handling distribution transformers in the shipping section of General Electric's Pittsfield Works has been attained by a crane unit having push button control permitting eight different movements. The service was formerly handled by the conventional type of fork truck. Hook cranes were also used, with the lifting hooks attached to lugs on top of the transformer. The crane will carry a transformer up and down, backwards and forwards, moving it to the left or right and can turn it 360 deg either to right or left.

Because the crane is able to operate in an aisle only 6 ft wide, an additional 2,500 sq ft of storage space has been made available in comparison with that which could be had with the fork truck. The fork truck called for a minimum aisle width of 10 ft. The crane has four ac motors: one 5-hp on the hoist; one ½-hp on its trolley; and 2-hp bridge motor and a ¼-hp turn motor. Its total lifting capacity is 4,000 lb, and it carries a control panel with eight buttons at shoulder height or better. Maximum vertical travel is 8 ft 6 in.; horizontal travel distance here is 315 ft, and the travel distance from side to side is 12 ft 8 in. A limit switch prevents the crane turning more than 360 deg in either direction.



DEGREASING CONDUIT nipples and elbows in electrically heated tank removes hazard experienced with former fuel-heated method

Electric Degreaser Triples Production

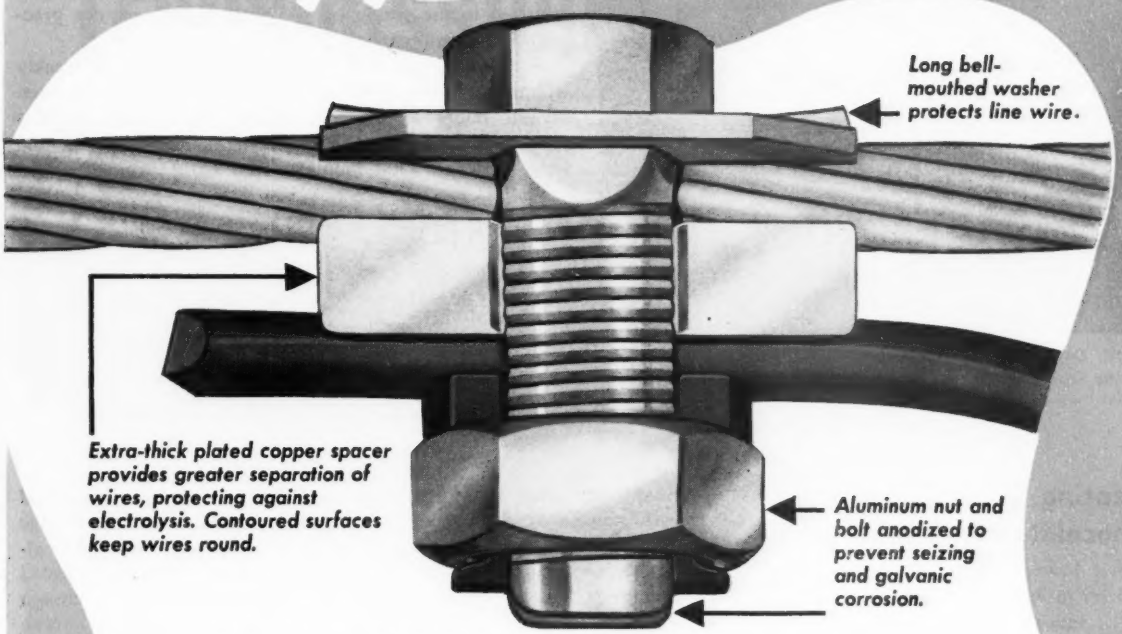
R. I. LAVELLE, Industrial Power Salesman, Duquesne Light Co, Pittsburgh, Pa.

Electric degreasing has tripled production, removed a fire hazard, and improved working conditions at Conduit Nipple Mfg Co, Pittsburgh, Pa.

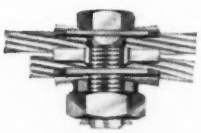
Formerly, degreasing was done by passing the nipples and elbows through a fuel-heated alkaline solution. This method was very unsatisfactory and was a fire hazard. It was discontinued and degreasing is now accomplished by suspending the parts in a cleaning solution vapor where they are cleaned thoroughly. The solution is vaporized by five 9-kw electric immersion units. The solution is maintained automatically at 180 F. Cold water, circulated in pipes at the top of the tank condenses the vapor and prevents it from entering the room.

After the parts are degreased, they are given a coat of lacquer. The lacquer is dried in an oven where forced air passes over the parts. The air is heated by 12 kw of electric strip heaters.

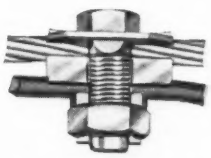
USE ALUMINUM CONNECTORS THAT ARE FIELD TESTED!


Long bell-mouthed washer protects line wire.
Extra-thick plated copper spacer provides greater separation of wires, protecting against electrolysis. Contoured surfaces keep wires round.
Aluminum nut and bolt anodized to prevent seizing and galvanic corrosion.

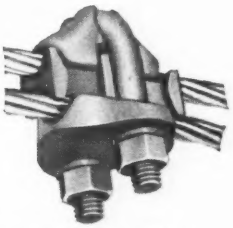
Type CA (above) — Ideal for Aluminum-Copper connections. Features indicated by arrows make this the outstanding connector for bi-metal use.



Type AAW — For Al. to Al. — All-aluminum connector with 2 bell-mouthed washers and aluminum contour spacer to hold wires in shape. Alumilite treated.



Type HPW — Tin-plated Duronze connector for Al. to Cu. or Al. to Al.



Cat. No. DLC 6-0 — Aluminum dead-end loop clamp, covers wire range 6 — 1/0 ACSR.

MANY thousands of BLACKBURN Aluminum Connectors have been giving satisfactory, trouble-free service in the field for 14 years. BLACKBURN Connectors and Clamps for aluminum conductor are designed to protect the wires against crushing as well as electrolysis. Yet these same fittings have extra gripping ability and extra strength to produce tighter and better connections. They are made of high strength alloys, and will give years of dependable performance.

BLACKBURN *Hi-Strength* CONNECTORS

Jasper Blackburn Corporation • 35 MADISON ST. • ST. LOUIS 6, MO. • Phone CEntral 3007

HAND DRYERS in airport rest rooms eliminate debris and provide cleaner and more sanitary conditions. Formerly, used paper towels stopped up sewer pumps, requiring costly maintenance and work

Electric Dryers Save $300 Monthly

Six electric hand dryers in two rest rooms are saving the Birmingham Municipal Airport $300 a month, providing cleaner and more sanitary rest rooms and eliminating debris according to Henry T. Cross, airport manager. Installed in the spring of 1952, the dryers require practically no maintenance.

Formerly paper towels were used, until the weekly stoppage of the sewer pumps (requiring 2 or 3 men several hours to correct) forced the management to change to linen towels. When the laundry bill for the linens reached $300 monthly, Mr. Cross decided to try something else. In addition, the rest rooms were continuously cluttered with unsanitary and dirty towels.

The electric dryers cost about $145 each, and after 6 months use have paid for themselves several times over, according to Mr. Cross. In addition, they are superior to the paper or linen towels since they prevent chapping. The dryers are rated at 20 amperes, 115 volts. It is planned to install additional electric dryers in the administration building, now being extensively remodeled.

Heating Cable Keeps Chocolate Flowing

Soil heating cable has solved the difficult problem of maintaining chocolate liquor fluid at the Ambrosia Chocolate Co and the Robert A. Johnston Co plants, Milwaukee, Wisc.

These companies pipe chocolate liquor to many places in their plants. Since it will solidify at temperatures below 88 F, this presents quite a problem, especially when the plant shuts down on weekends. These plants found it necessary to run steam pipes parallel to their chocolate lines to keep the chocolate liquor fluid. The steam pipes are bulky and lose much of their heat to the room—creating undesirable temperature conditions.

This problem was easily solved by spirally wrapping soil heating cable around the chocolate pipes and then covering them with ordinary pipe covering. The chocolate pumps were heated with 1200-w ring type heaters.

Before the soil heating cable was used, it sometimes became necessary to use a blow torch on the distribution piping to get the chocolate moving, especially on a Monday morning after the plant had been shut down for two days.

The Ambrosia Chocolate Co has over 1,000 ft of cable (about 10kw) in various lengths. Where a shorter length of cable was required than the standard 60 ft, 120-v length, a transformer was used to furnish the proper voltage for the cable used. The Robert A. Johnston Co have over 3,000 ft of heating cable (about 20 kw) on their chocolate piping. C. H. Swenson, Industrial Power Engineer, Wisconsin Electric Power Co, Milwaukee, Wisc.

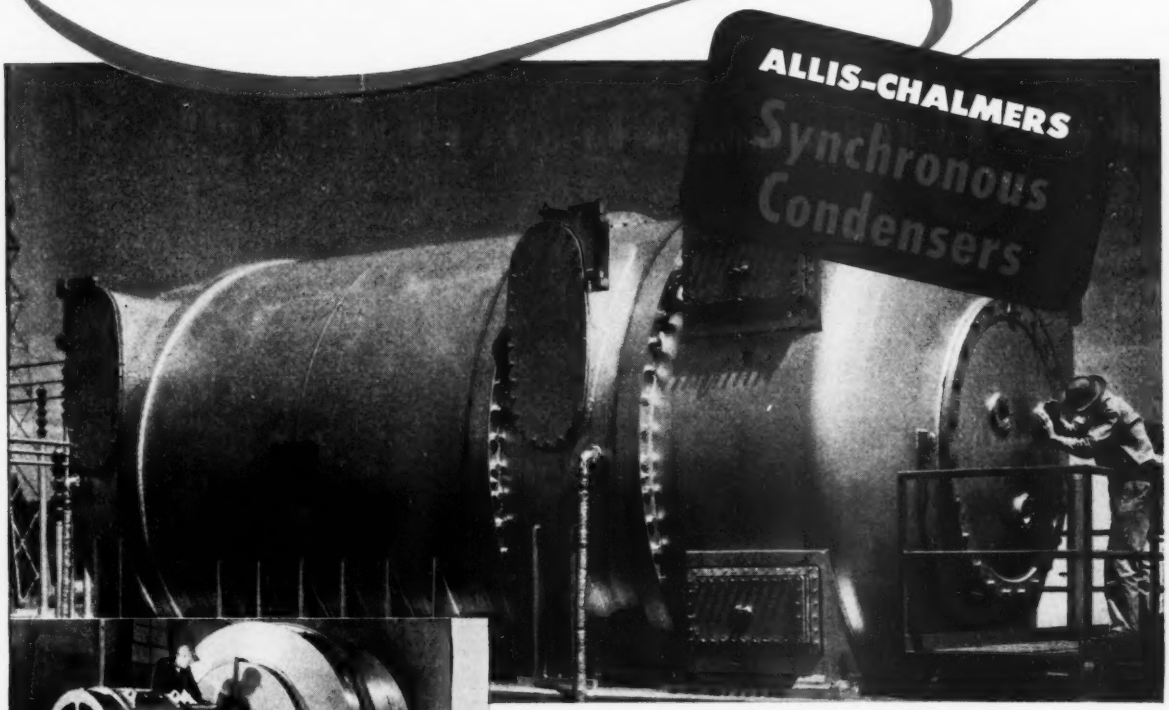
INDUSTRIAL BRIEFS

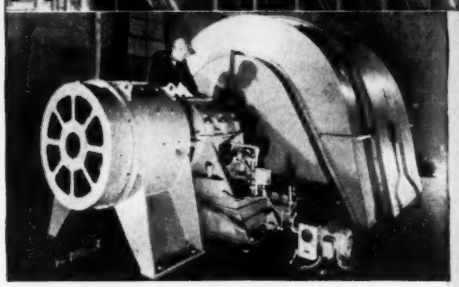
Bright annealing and silver soldering in a conveyor type electric furnace at the M. S. Co, Attleboro, Mass., has eliminated scale and open links in silver and gold chain experienced with the previously used gas flame method. Control of temperature to plus or minus 5 F. is assured. A 28-ft, 18-kw, 230-v, 3-phase conveyor type furnace with ammonia dissociator and an operating range of 1200 to 1800 F is used. George B. Newton, Power Sales Engineer, Attleboro Steam and Electric Co.

Tank heating with electric water circulation heater has solved problem of heating caustic tank at the Cold Spring Bleachery Co, Yardley, Pa. 15,000 gal of 50% caustic solution are maintained at 80 F. Solution is used in processing. A means of heating the solution was required which would be automatically controlled and trouble-free. Direct application of electric immersion heaters in this concentrated solution was not advisable. As storage tank was already equipped with heating coils, a simple method consisted of circulating warm water through these coils. A 24-gal expansion tank equipped with a 15-kw automatically controlled circulation type heater for use on 3-phase, 230-v supply was piped to the coils. While heating requirements to maintain losses amount to about 8 kw, additional capacity heats make-up solution when added to storage tank. A. D. Spillman, Ind. Application Section, Philadelphia Electric Co.

Machining spiders with a vertical turret lathe at the American Laundry Machinery Co, Cincinnati, Ohio, has increased production and cut completion time from 2 hr to less than an hour. Complete machining operation of each spider is set up on the vertical turret lathe. This is accomplished by proper setting of limit stops on the strings of each "banjo box." Each motion is controlled by a separate "banjo box." The various motions are set up in proper sequence. Each motion is driven by a 240-v, 3-phase, 60-cycle motor. Lathe has one 30-hp, one ½-hp and two ⅓-hp, 3-phase motors; also one small synchronous control motor. The electrical control is supplemented by a hydraulic system. L. J. Langevin, Power Engineer, Cincinnati Gas & Electric Co.

Better than Rebuilding Transmission Lines





Pacific Coast system uses 50,000-kva hydrogen-cooled condenser (top view), and 20,000-kva air-cooled unit (bottom view).

Besides minimizing losses, hydrogen cooling results in a design suited to outdoor operation. Air-cooled units can also be built for outdoor use, and for industrial power-factor-correction applications.

Regulex amplifier control, which acts as both regulator and pilot exciter, is available for all synchronous condenser ratings.

Regulex is an Allis-Chalmers trademark.

FOR WIDESPREAD power systems, synchronous condensers can frequently be used in place of added or larger transmission lines. This is possible because, by supplying reactive kva, they assure efficient use of power lines.

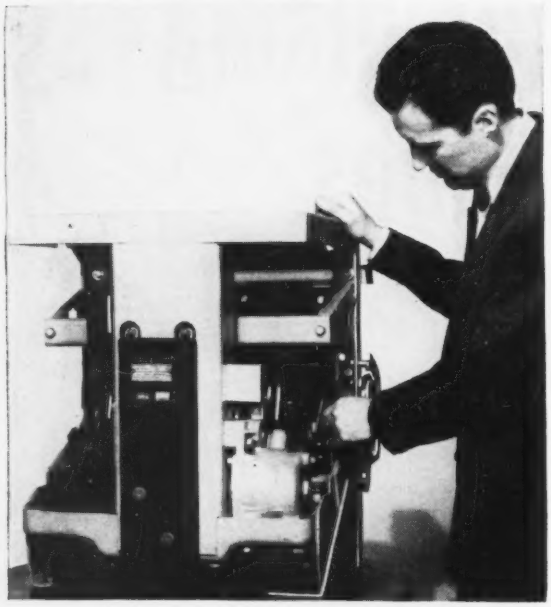
But condensers can do more than just cut conductor requirements. They also provide voltage regulation on a wholesale scale, and furnish rotating inertia for improved system stability.

Custom-engineered to fill system requirements and to fit installation conditions, Allis-Chalmers synchronous condensers can help you hold down transmission costs. For more information on units for utility or industrial applications, call in your A-C representative, or write for Bulletin 05B7285. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3960

ALLIS-CHALMERS

NEW EQUIPMENT



Air Circuit Breakers

For 600-v ac or 225-v dc circuits with interrupting ratings from 15,000, to 100,000 amp and continuous current ratings from 15 to 4,000 amp. The new line can be manufactured for fast shipment from standardized circuit breaker, control instrument and bus compartment building blocks.

The 50-, 75- and 100-kva interrupting rated breakers have a stored energy mechanism to close the breaker without control power. This is accomplished by energy stored in a spring.

Breakers are equipped with triple-characteristic, overcurrent tripping devices, providing characteristics required for different applications.

General Electric Co, Schenectady 5, N. Y.

Insulating Compound

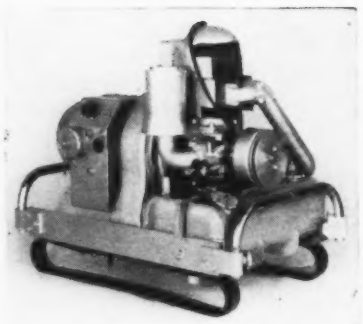
Called Harvel Oil Stop, claimed to provide oil seal on cable splices where oil pressure is encountered. It is used as a binder between layers of insulating tape to keep out moisture and oil. The compound is said to adhere to rubber, oil-impregnated paper, varnished cambric tape, fiber, Bakelite and copper.

Irvington Varnish & Insulator Co, Irvington 11, N. J.

Engine Generator

Rated at 5 kw, single-phase, 60 cps, 115 or 230 v, is called Model 32A115/230-1. It is a carryable generator for operating electric tools in the field and for energizing lighting. A 115-v convenience outlet is supplied together with a special waterproof 3-pole receptacle for connecting either 115 or 230-v equipment. Voltage regulation from no load to full load is approximately 4%.

Claimed to withstand the roughest use, the generator has ball and needle bearings. A pressure vapor oiling system assures lubrication of all engine parts. Major castings are of durable aluminum alloy. Rain- and dust-proof ignition, plus an adjustable jet-type pressure fuel system make the one-cylinder, air-cooled, 10-hp, 2-cycle gasoline engine easy to start under all weather conditions.



Weighing 228 lb, the unit is 29 in. long, 24½ in. wide and 25½ in. high

Homelite Corp, Port Chester, N. Y.

Hydraulic Lift

For mounting on truck chassis, with a lift of 30 ft. It has a 4 x 11-ft platform, carries 800 lb, rotates

HUBBARD *Sets Up* THE PINS

. . . Saves You Time, Space and Trouble

HUBBARD has solved a pressing problem in the electrical industry, in the standardization and consolidation of its line of Pole Top Pins. The company has reduced the number of catalogued pins from 24 to 8, yet the line covers all manufacturers' and associations' standards regarding strength ratings, hole spacings, finish and lead threads. These rugged pins are available in lengths from 15 to 24-inches. Each pin is pressed from a single piece of steel and is Hubbard Double-Dip Hot Galvanized.

The lead threads cast on Hubbard Pressed Steel Pole Top Pins are of the Allen Type. All Hubbard lead thread pins feature a cushioning ridge on the top of the thread which flows slightly under insulator pressure and thus prevents the insulator tops from popping off. Threads are carefully gauged with an E.E.I. standard thread gauge for 1-inch and 1⅜-inch threads.

The new line simplifies inventory problems. The utilities warehousemen can satisfy the needs of their line crews from fewer different items in stock, and the construction crews in turn can cope with more situations with one pin than ever before.

Write for complete information and prices.

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

ALLEGHENY
CO. ALLEN BRADLEY
ALLIS-CHALMERS MFG. COMP
AMERICAN CAN COMPANY · AMERICA
CO · AMERICAN CYANAMID CO · THE AMERIC
ATOMIC ENERGY PROJECT · ARMCO STEEL CORPORATI
N.Y. BELL TELEPHONE LABORATORIES, INC · BIRD & SON · TH
BETHLEHEM STEEL CORPORATION · BOYD ELECTRIC COMPA
THE BUDD COMPANY
CADILLAC TANK
CONTAINER CO
Y · DETROIT ED
E. I. DUPONT DE
NC · DOESKIN PR
ELECTRIC BOAT
D · ESSO STANDARD
G.E. JET ENGINE P
NC · GENERAL MOTOR
GIMBEL BROTHERS
N.Y. HERCULES PO
HOTPOINT, INC · H
RP · HATFIELD ELEC
NLAND STEEL COMPA
N · INTERNATIONAL HAR
JORDAN MARSH COMPAN
CO · KOPPERS COMPANY,
KRAFT FOODS CO. LANE
CAN · P.R. MALLORY & CO.
MARE ISLAND NAVAL SHI
MARION ELECTRICAL INS
RCO · MIDLAND STEEL PRO
MONSANTO CHEMICAL CO.
PORTSMOUTH NAVAL SHIPYARD
CO · PROCTER & GAMBLE CO · PURDUE U
OS. SCHLITZ BREWERY CO · SOUTHERN
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Amp-trap®

Super-Current Slayer

Here are just a few of those who use Amp-trap to prevent the development of heavy short-circuit currents. Lightning fast Amp-trap with its Interrupting Rating of 100,000 Amperes R.M.S. at 600 Volts and below, saves them money. It provides complete and positive short-circuit protection at lowest cost and permits the safe, quick and economical expansion of existing power circuits. It will pay you to investigate Amp-trap. Do it now. Write for Amp-trap bulletin and ask for prices.

In Canada — POWERLITE DEVICES Ltd., Toronto & Montreal

OUR 60 YEARS — Est. 1893

AMP-TRAPS — "Awake At The Switch"

THE **CHASE-SHAWMUT** CO.

370 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

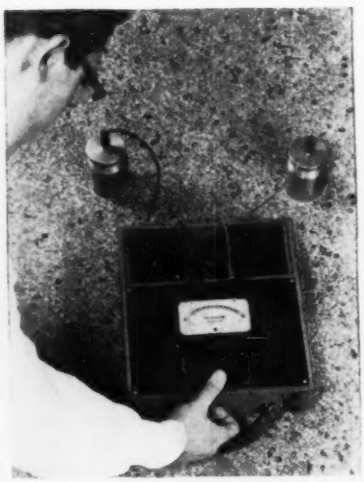
Amp-trap · Tri-onic · td · C-O-T · Trionet · ONE-O-T TYPE · FUSE WIRE

through 360 deg, has a 42-in. collapsible guard rail and a kickboard to prevent loss of tools.

Hydraulic controls raise, lower, or stop the platform at any position. The pump is driven from a power take-off through an open center valve.

Servicing of lights, wiring and pipe installation, and insulator washing are a few of its uses.

Hamlin-Klock Corp, Pasadena, Calif.

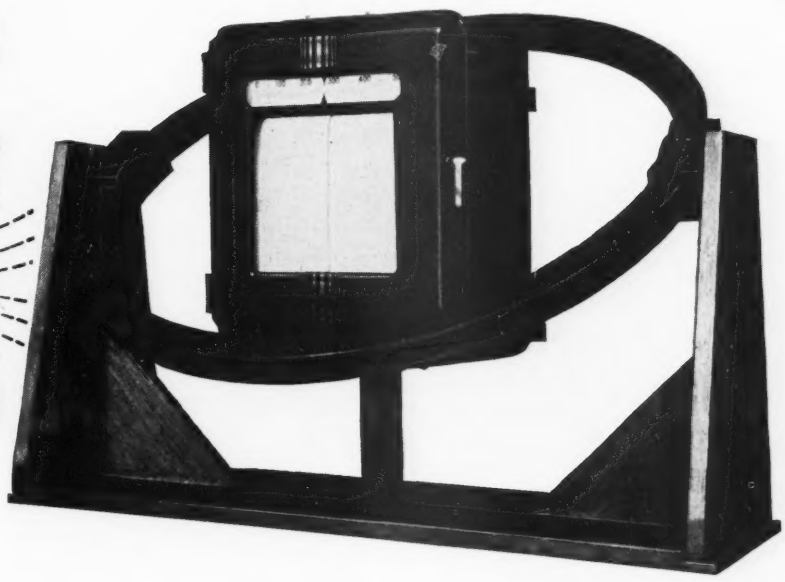


Conductivity Tester

Can be used in hospital operating rooms and other locations where hazardous atmospheres or chemicals

Here's how L&N engineers verify Speedomax resistance to stray electrical fields. The ring is a Helmholtz coil, adjustable for a wide variety of field effects.

Speedomax is engineered for FIELD service



● Built into every Speedomax recorder and controller is a high degree of indifference to stray electrical fields. And this is one of its most useful characteristics in almost any job. It means that you can install a Speedomax near a big motor, power line or X-Ray machine—any electrical equipment in fact—and you'll probably see no effect at all from surrounding electronic noise and "junk".

The reason for this indifference to stray fields goes back through the adjustment, building and design of the instrument, to its basic engineering. Speedomax has an *electronically-clean measuring circuit*, as well as clean signal and amplifier circuits.

This clean design includes a bifilar-effect slidewire, to eliminate any objectionable inductance at that point. It includes our "no-moving parts" trolley contact on the slidewire, which eliminates pigtails and their variable inductances. It includes use of a Mumetal slidewire shield where desirable, instead of less expensive but lower-permeability aluminum. And it includes a lot of just downright meticulous detailing, such as carefully engineered wiring and input filtering, plus ingenious shielding where required.

These and other precautions eliminate out-of-phase components in the supply to the amplifier. The latter therefore doesn't "load"; hence sends the correct amount of correct-phase power to the balancing motor. With ample power, the motor's recording and control action is snappy and accurate.

Our Catalog ND46(1) and Technical Publication ND46(1) tell the story. Write our nearest office or 4938 Stenton Avenue, Philadelphia 44, Pa.

Power engineers and users find that Speedomax instrument operation is not affected by the stray fields created by nearby power lines, motors, telemetering equipment and so on.

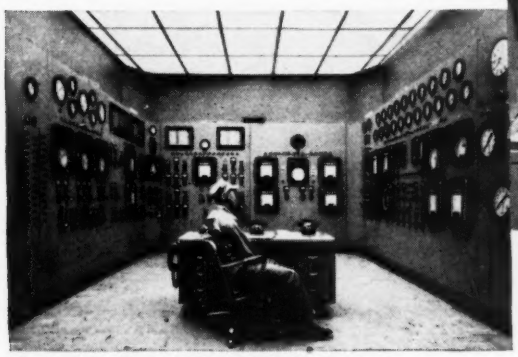


PHOTO COURTESY CINCINNATI GAS & ELECTRIC CO.

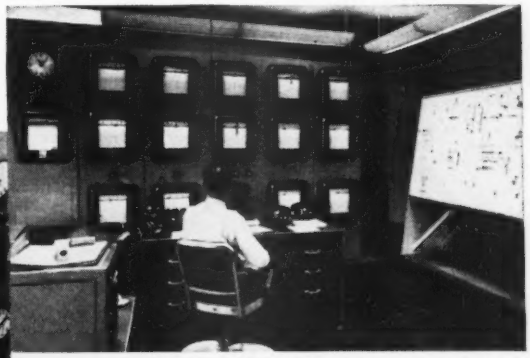


PHOTO COURTESY IOWA-ILLINOIS GAS & ELECTRIC CO.

Jrl Ad ND46(10b)

LEEDS NORTHRUP

instruments *automatic controls • furnaces*

require prevention of static electricity discharges.

Model No. 269 has two color-coded scales, one for conductive material tests and the other for personnel and conductive shoe tests. Two 10-ft leads, furnished, are used with the 5-lb floor electrodes or for connection to other apparatus being tested.

The instrument operates from two self-contained No. 6 dry cells. It is housed in a steel case with a removable cover; the size is 12¼x10¾x 5¼ in. Net weight equals 28 lb.

Associated Research, Inc, Chicago 18, Ill.

Deodorizing Lamp

Consumes 4 w, emits ultra violet radiation, for household and commercial use. The ultra violet radiation converts oxygen into ozone, which detroys objectionable odors.

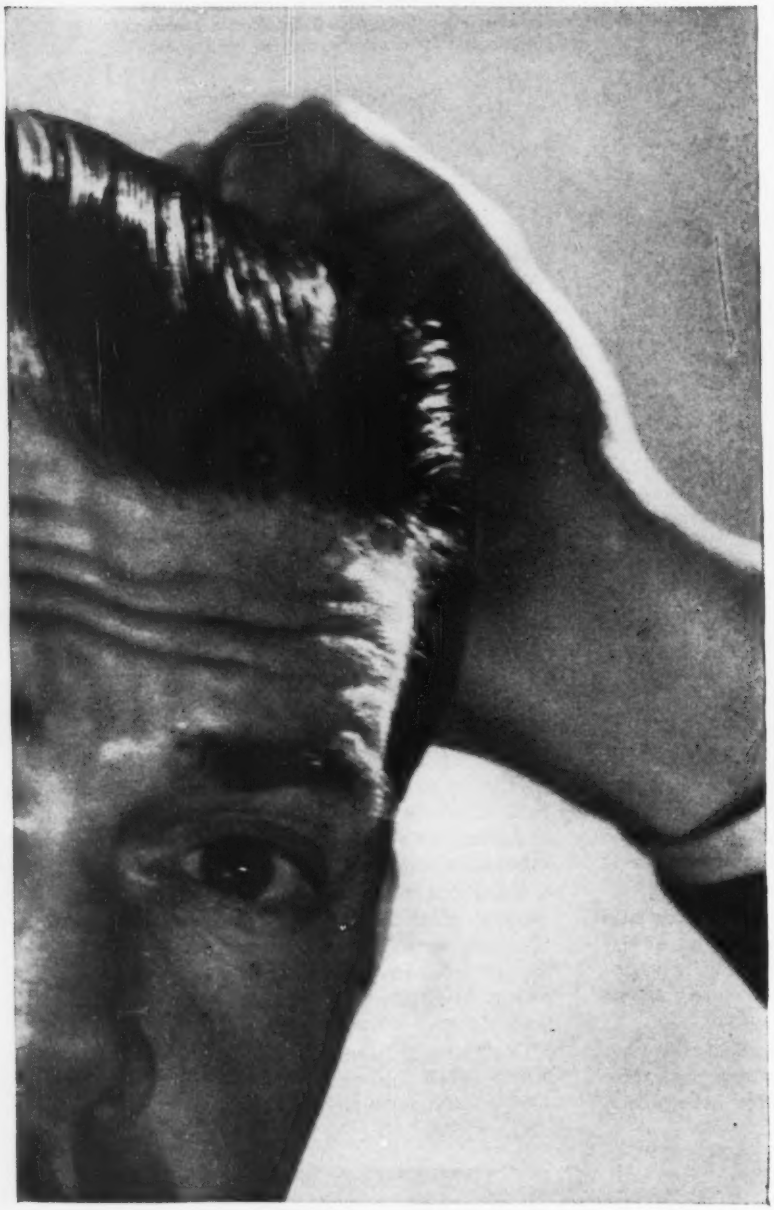
It is claimed that good efficiency of the lamp results from a bimetal switch. The switch opens once the lamp has started, making it possible to send more energy through the arc.

Ballasting of the lamp is accomplished with either a choke ballast or a 40-w incandescent lamp. Fixtures in which these lamps must be used and ballasts can be obtained from numerous manufacturers.

Sylvania Electric Products, Inc, New York 19, N. Y.

Signal Generator

Designated model 612A, offers continuous coverage between 450 and 1,200 Mc. Frequency and output are directly set and read on large dials; no chart or interpolation are necessary. Maximum output is 0.5 v into



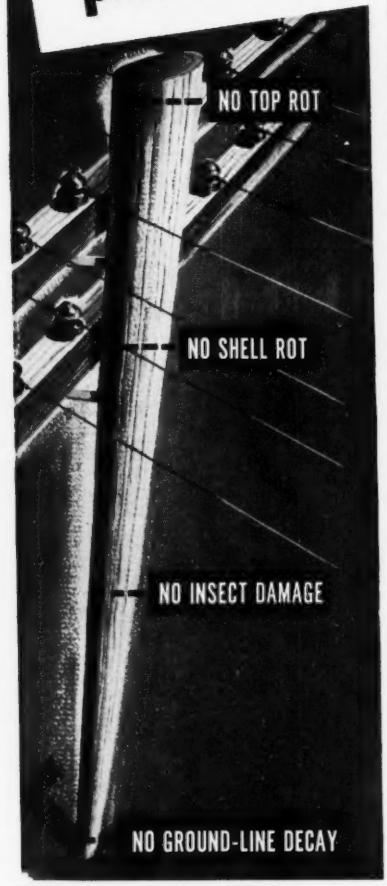
Don't scratch for the solution—

"AMPROBE" IT!

Is that motor overloaded? Does the system need rewiring? Snap the Amprobe around one conductor (insulated or uninsulated) and you have your answer in seconds. It's the only pocket-size snap-around volt-ammeter, for measuring current instantly without shut-downs or ammeter connections. Write for Catalog. Dpt. EW-33, Pyramid Instrument Corp., Lynbrook, N. Y. (Export Div.: 458 Broadway, N. Y. 13).

Amprobe "600" 0-15/30/60/150/300/600 amps A-C. 0-150/300/600 volts A-C. Complete with cowhide case and voltage test leads, $59.50. Amprobe "1200" (to 1200 amps A-C) $67.50 complete. Amprobe "300" (to 300 amps A-C) $49.50 complete.

Penta gives CLEAN protection



The clean way to safeguard poles, crossarms and other wood construction is the PENTA way. This chemical formula is always the same—deep-penetrating, powerful, long-lasting. PENTA-treated poles last years longer, cost less to maintain . . . and they're *clean*. Write today for names and companies near you supplying PENTA-treated wood products.

CHAPMAN CHEMICAL COMPANY

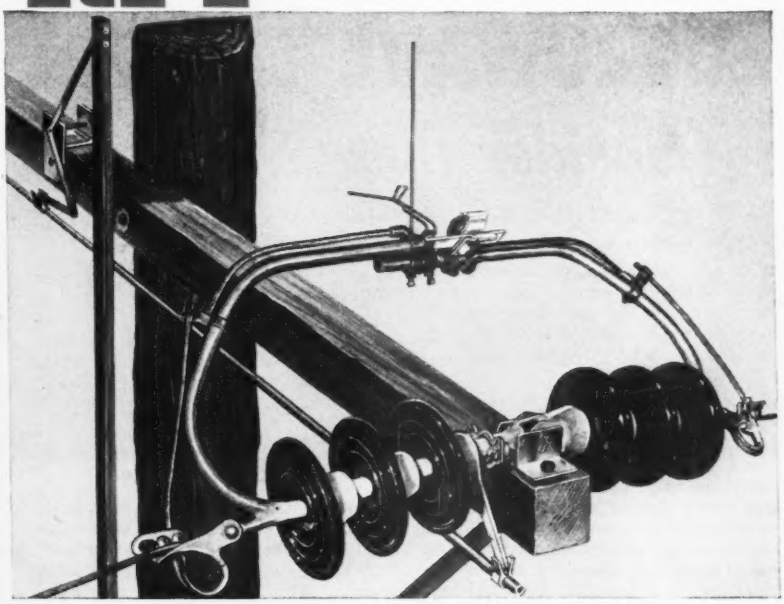
Dermon Building, Memphis 3, Tenn.

CHAPMAN®

Penta Preservative

Conforming to A.W.P.A. Specification P8 and P9

KPF POLE TOP SWITCHES



Simple design means more switch ...for less money!

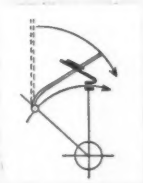
KPF Pole Top Switches cost less because they are simplest in design. They lower installation costs because they bolt on a single crossarm in minutes, require no extra insulators. KPF switches save, too, on upkeep; simple push-pull interphase rods never bind because of crossarm warpage; monel and bronze bearings never need lubrication.

KPF switches may be used in horizontal, vertical or triangular mounting. Free floating, self aligning blades and jaws maintain proper contact under all conditions of switch sag adjustment.

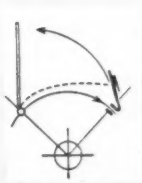
NEW QUICK-BREAK ATTACHMENT FOR KPF SWITCHES

The split-second breaking speed of these new KPF attachments means you can switch many circuits without using expensive circuit breakers. Attachment is available for all KPF switches rated 15 to 69 kv.

WRITE FOR DETAILS



Spring rod winds to full tension as switch opens.



Rod springs clear, breaking contact at high speed.

KPF ELECTRIC COMPANY

1624 E. Alpine Avenue • Stockton 5, Calif.

Before you buy anybody's MICROWAVE SYSTEM

Consider these 5 facts!

1. Who is the manufacturer?

When you specify RCA, the answer is easy. Because RCA is the world's greatest name in radio, television, and related activities. RCA has pioneered in high-frequency radio communications and really knows microwave from start to finish.

2. What has he actually done in the microwave field?

Again, RCA has rolled up an impressive record. Installed and operating are more than 19,000 channel miles of RCA microwave systems, for pipelines, power utilities, turnpikes, and government agencies. One system is over 1000 miles long, extends from New York to Washington and Pittsburgh. And after three years' continuous experience, expansion is being planned . . . proof enough of *outstanding RCA performance.*

3. Is he equipped to install microwave?

Again, with RCA, the answer is "yes." RCA will handle your installation for you . . . will even furnish you with a detailed aerial survey of the microwave route.

4. Is he equipped to maintain microwave?

Again, RCA is out in front, with a nationwide service organization geared to handle your microwave maintenance on a 24-hour basis. It's the *RCA Service Company*—already well known for its service to industry on other types of electronic equipment. It's available to you when *you* specify RCA.

5. Is the equipment designed with an eye to the future?

Yes . . . if it's RCA equipment.

For instance—consider the matter of adding additional voice and signal channels. Thanks to RCA's "eye to the future" design, you can add or drop channels at any station with a minimum of cost . . . a minimum of equipment.

Why settle for less than RCA MICROWAVE?

When you start talking about microwave, you're talking about *money*. So isn't it just good sense to be sure you invest in the best? With RCA, you're dealing with the leading name in radio . . . with men who *know* microwave. *So specify RCA—and be sure.*

You get these 7 plus features with RCA Microwave

1. Uses conventional tubes throughout.
2. Easy to tune. Has built-in metering.
3. Handles large number of single sideband frequency division channels without excessive cross-talk.
4. Flexible. Any or all voice or control channels can be picked up or dropped at any station, repeater or terminal.
5. Service channel with signaling available at each repeater and terminal station.
6. Vertical space, provides ready access both front and rear.
7. Designed, built, and backed up, by RCA . . . world leader in electronics.

RCA

RADIO CORPORATION of AMERICA

MORE INFORMATION? MAIL COUPON TODAY

RCA Communications, Dept. 450, Camden, N. J.

Without obligation, please send me more information on RCA Microwave for the specific application indicated:_____

Name_____

Position_____

Company_____

Address_____

City_____ State_____

☐ Please have an RCA Microwave Engineer call on me.

50 ohms throughout frequency range.

The instrument is said to offer broad brand modulation up to 5 Mc, and has low incidental FM. It can be modulated internally or externally, amplitude or pulse modulated with good of pulses 0.2 microseconds or longer. Pulse modulation may be applied to the amplifier or direct to the oscillator section.

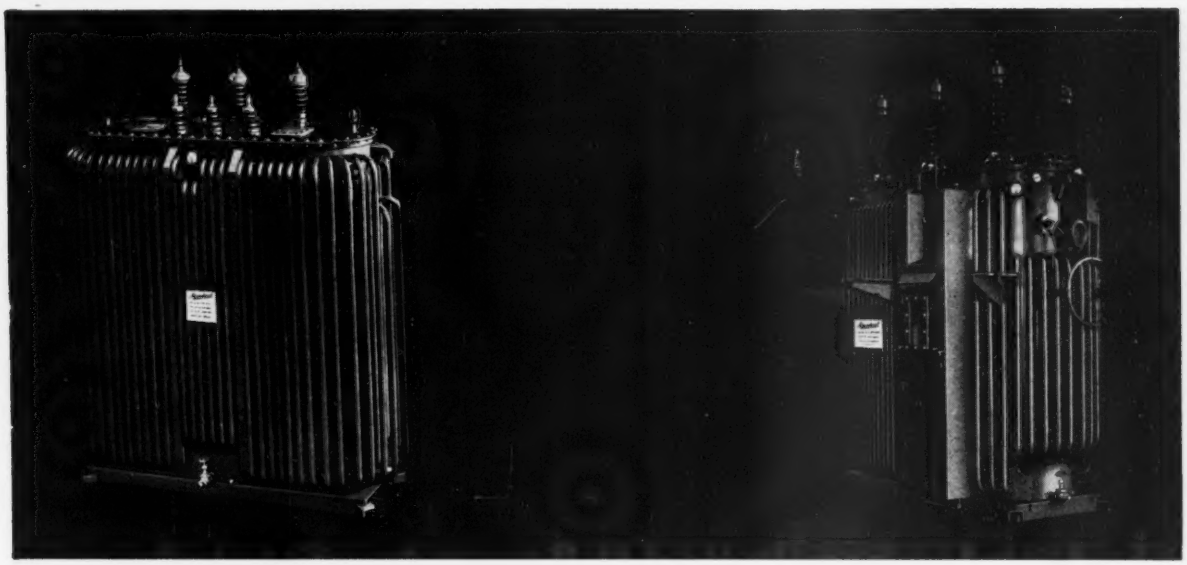
Hewlett-Packard Co, Palo Alto, Calif.

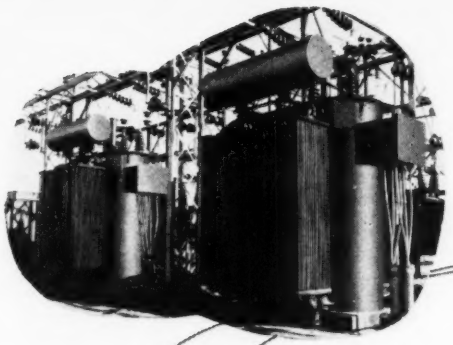
Flexible Conduit

Conduit Sealtite Type US, is the first of its kind to gain Underwriters' Laboratories approval for use in wet locations. The tough, extruded synthetic covering over Sealtite's flexible metal core protects wiring against moisture, oil, dirt, chemicals and corrosive fumes.

The conduit is made of spirally wound, interlocked zinc-plated steel strips with a copper bonding conductor wound spirally in the space between each convolution on the inside of the conductors. It can be cut to required lengths and bends easily.

Available in long lengths in nominal





When dependability is a factor...

● Dependability in a transformer to you means trouble-free performance and long service life. To us, this means dependable construction.

For example, at STANDARD . . .

Tanks are built of rust-resisting steel, arc welded seams and tested under pressure. Liberal clearances are allowed from the windings and leads to tank and cover.

On the outside . . . attractive, long-wearing finishes with a primer coat and two finish coats of blue-gray enamel . . . on the inside, a lining of red oxide.

Covers are carefully and accurately fitted.

Tap changers and accessories efficiently placed with a specially designed tap changer switch.

These are just a few of the construction factors which STANDARD builds into Power Transformers. Look to STANDARD when you want dependability.

Everything Points To...

WRITE FOR BULLETIN CL-50

Tells the story with words and pictures of STANDARD'S complete line of transformers, and how they perform for every class of service . . . on the job.

Standard

THE STANDARD TRANSFORMER COMPANY

Trade Mark ®

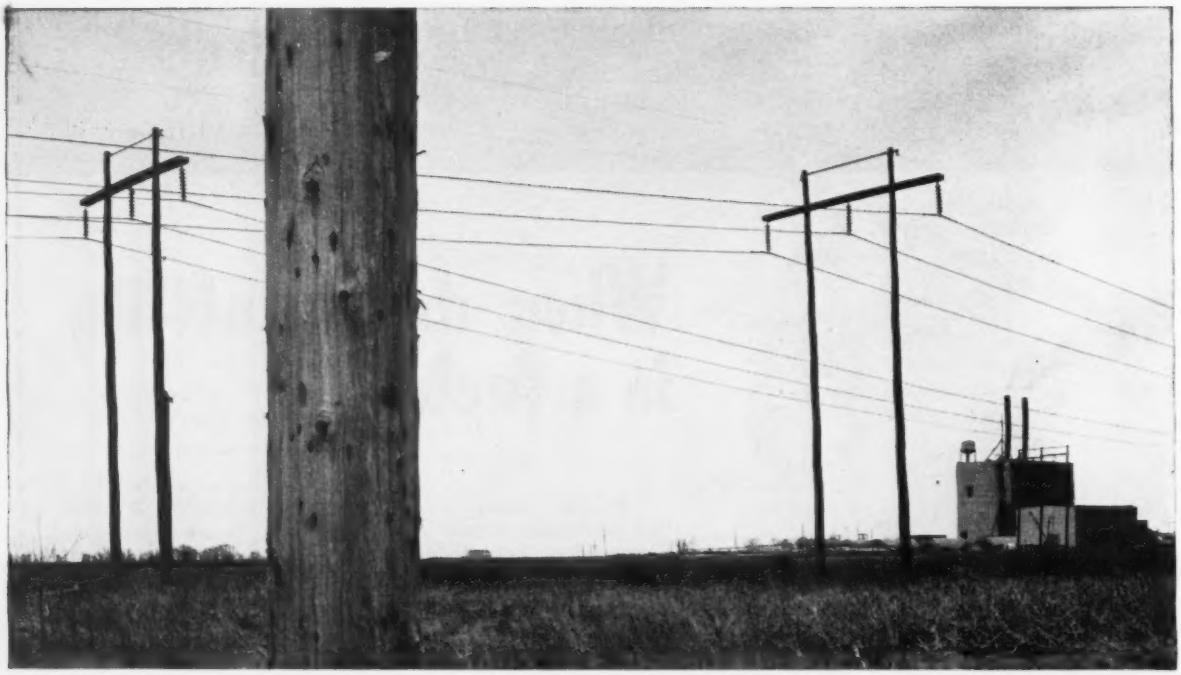
WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

DOW

H-FRAMES BUILT TO LAST BY A LEADER IN POWER TRANSMISSION

Consumers Power protects new Erie transmission line with clean PENTA, the modern wood preservative



The Dow Chemical Company
Dept. PE 3-2B3, Midland, Michigan

- ☐ Send me free booklet, "Pointers on Penta."
- ☐ Send me list of PENTA treating plants.
- ☐ I am interested in the application of PENTA to_____

Name_____

Title_____

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Address_____

City_____ State_____

Congratulations to Consumers Power on the recent completion of the first two units of its new Justin R. Whiting power station and three important transmission lines at Erie, Michigan.

We are proud that PENTA*, the clean wood preservative, was elected to play a part in keeping this new network of power lines sound and serviceable for many years to come. This is a high compliment from a company well known for its progressive policies and dependable service.

From a standpoint of service and dependability these PENTA-treated H-frames will give a good account of themselves.

PENTA-treated poles and crossarms give positive protection against decay and termite attack.

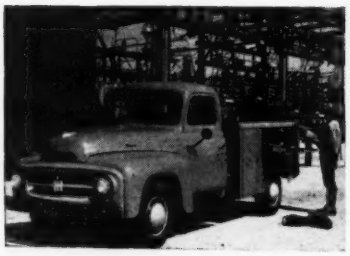
Along with lasting protection, PENTA-treated poles are clean and attractive. They present a pleasing appearance along the countryside. Because PENTA gives a clean treatment, linemen find them easy to work on. Write for more information about *PENTAchlorophenol, the clean, modern wood preservative. THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS

DOW

electrical ID sizes ⅜ in. to 1¼ in. UL approved fittings for use are readily available.

The American Brass Co, Waterbury, Conn.



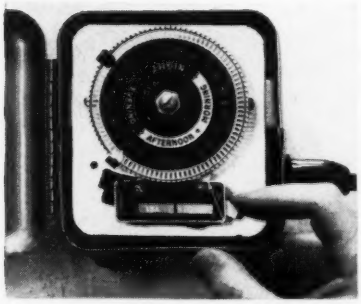
Utility Pickups

Models R-110, R-120 and R-130, with 115-, 127- and 134-in. wheelbases, have 6½, 8- and 9-ft all-steel bodies. Gross vehicle weight ratings range from 4,200 to 8,600 lb.

A variety of axle ratios and transmissions is offered. The trucks are powered by a 100-hp, valve-in-hand, Silver Diamond 220 engine.

They are part of 168 basic truck chassis models in 296 wheelbases offered in the R line.

International Harvester Co, Chicago 1, Ill.



Time Switch

Is portable, plugs into a convenience outlet, telechron motored, and is 24-hr fully automatic. It will turn electrical devices "on" then "off" at the exact times designated. Triggers are provided for changing time setting to the desired values.

Called No. 919, it has a 6-ft extension cord, is UL approved, and measures 5 x 5 x 3½ in. The clock operates only from ac sources and has a switching capacity of 1,650 w. Four rubber legs permit it to stand without dan-

(*Continued on page* 180)

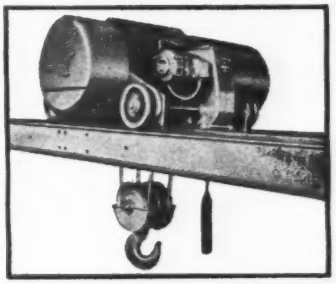
you'll be better off

FROM START TO STOP

with a

BROWN BOVERI

QuickSTOP MOTOR



Electric trolley hoist driven by three QuickSTOP Motors.

Here's the combination BRAKE & DRIVE, all-in-one motor that's designed to "take it" in tough industrial service.

QuickSTOP Motors require no outside power source or special controls for applying or releasing their brakes. They release their brakes and start instantly when power is applied. When power is cut, they stop and brake with 150% of normal torque. Absolutely no creep or backlash. Like any standard 3-phase motor, they can be reversed.

Suitable for reversing operations. Vertical or horizontal mounting. QuickSTOP Motors are available as drip-proof motors from .3 to 8 HP or as totally enclosed motors from .2 to 4 HP.

Where fast stops and starts are a problem—on original equipment or for replacements—it pays to install Brown Boveri QuickSTOP MOTORS. Get the facts about these world-famous, dependable, trouble-free motors.

QuickSTOP Motors are now used in

- Machine Tools
  - Planing
  - Automatic 4-spindle Drilling & Tapping
- Graphic Arts Machinery
- Textile Machinery
- Pulley Block and Trolley Hoists
- Watchmaking Equipment
- Sugar Processing Units

MAIL COUPON TODAY

Please send me data and prices on QuickSTOP Motors

Name..... Title.....

Company.....

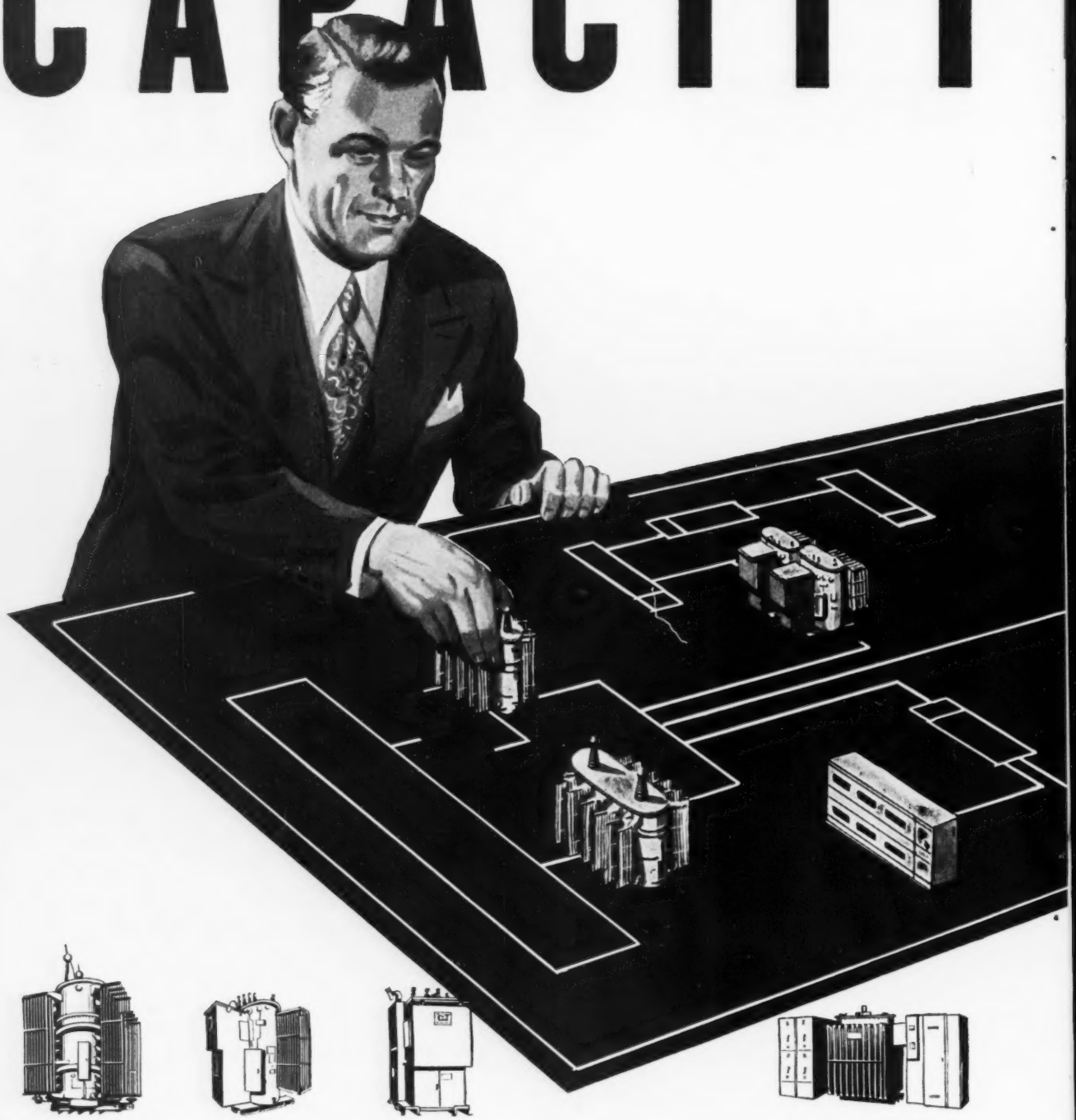
Address.....

BROWN BOVERI

BROWN BOVERI CORP.

19 Rector St., New York 6, N. Y.

CAPACITY



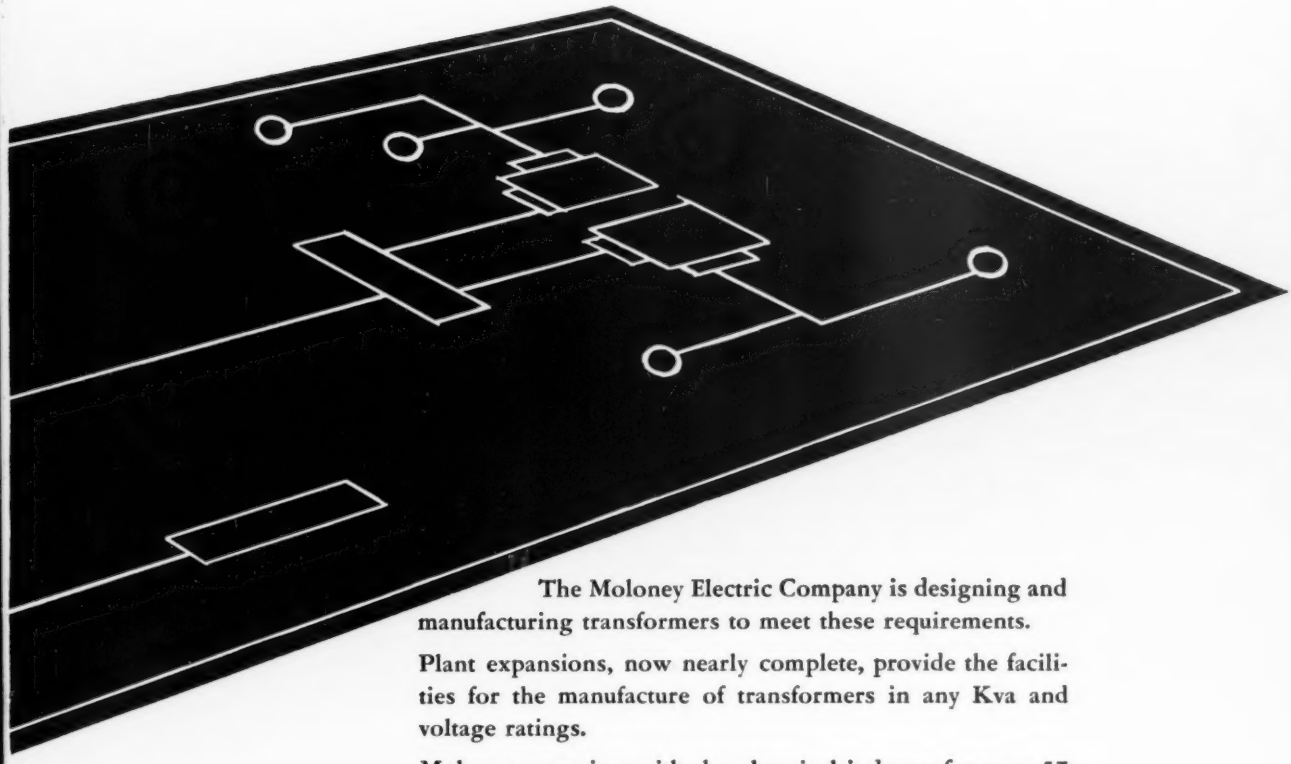
MOLONEY ELECTRIC

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS

. . . TO FIT YOUR PLANS

The increased use of electrical power has required utility engineers to design toward greater capacity and higher voltages. Today's planning requires engineering and manufacturing facilities capable of producing equipment of these higher Kva and voltage ratings.

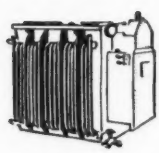


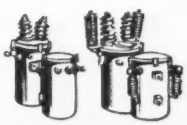
The Moloney Electric Company is designing and manufacturing transformers to meet these requirements.

Plant expansions, now nearly complete, provide the facilities for the manufacture of transformers in any Kva and voltage ratings.

Moloney, growing with the electrical industry for over 57 years, has the transformer manufacturing and engineering capacity . . . *"to fit your plans."*

ME53-8





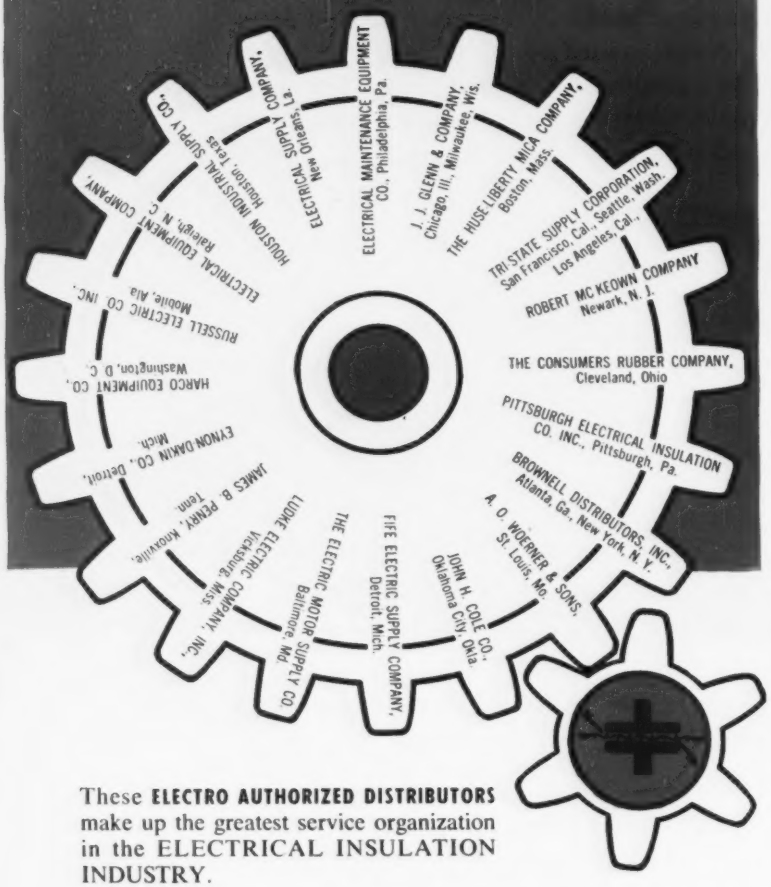
C O M P A N Y

Transformers • Step Voltage Regulators • Unit Substations

MO. AND TORONTO, ONT., CANADA

MOLONEY ELECTRIC = BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

GEARED TO SERVE the electrical industry


ELECTRICAL MAINTENANCE EQUIPMENT CO., Philadelphia, Pa.
J. J. GLENN & COMPANY, Chicago, Ill., Milwaukee, Wis.
THE HUSE LIBERTY MICA COMPANY, Boston, Mass.
TRI STATE SUPPLY CORPORATION, San Francisco, Cal., Seattle, Wash., Los Angeles, Cal.,
ROBERT MC KEOWN COMPANY Newark, N. J.
THE CONSUMERS RUBBER COMPANY, Cleveland, Ohio
PITTSBURGH ELECTRICAL INSULATION CO. INC., Pittsburgh, Pa.
BROWNELL DISTRIBUTORS, INC., Atlanta, Ga., New York, N. Y.
A. O. WOERNER & SONS, St. Louis, Mo.
JOHN H. COLE CO., Oklahoma City, Okla.
FIFE ELECTRIC SUPPLY COMPANY, Detroit, Mich.
THE ELECTRIC MOTOR SUPPLY CO. Baltimore, Md.
LUDKE ELECTRIC COMPANY, INC., Vicksburg, Miss.
JAMES B. PENRY, Knoxville, Tenn.
EVANS-DAKIN CO., Detroit, Mich.
HARCO EQUIPMENT CO., Washington, D. C.
RUSSELL ELECTRIC CO. INC., Mobile, Ala.
ELECTRICAL EQUIPMENT COMPANY, Raleigh, N. C.
HOUSTON INDUSTRIAL SUPPLY CO. Houston, Texas
ELECTRICIAL SUPPLY CO. New Orleans, La.

These **ELECTRO AUTHORIZED DISTRIBUTORS** make up the greatest service organization in the ELECTRICAL INSULATION INDUSTRY.

Today, design and maintenance engineers are confronted with the job of selecting trouble-free insulation materials. This task is made easier with ELECTRO'S dependable products plus engineering service and availability through ELECTRO AUTHORIZED DISTRIBUTORS.

Manufacturers of electrical equipment have two important rights: (1) To use the finest electrical insulation materials made, (2) To have the latest technical data concerning these products. Electro-Technical offers you both through their authorized distributors. Write for information and samples.

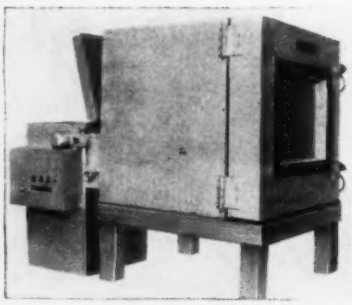
ELECTRO-TECHNICAL PRODUCTS

DIVISION OF SUN CHEMICAL CORPORATION

113 East Centre Street, Nutley 10, N. J.

ger of marring wood or finishes. It may be hung on a single nail on a wall.

The Tork Clock Co, Inc, Mount Vernon, N. Y.



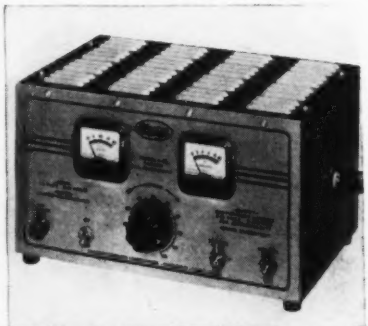
Environmental Test Unit

Comprising two parts, the servo unit and the test chamber, the equipment furnishes controlled temperatures needed for numerous tests. An attachment will maintain relative humidity from ambient to 95% in a temperature range from ambient to +180 F.

The servo unit, a portable air conditioner, provides air circulation of 40 cfm. At −100 F this circulation over dry ice will absorb 1,700 Btu per hr, it is claimed. Up to 185 F this circulation around electric heaters is said to deliver 5,000 Btu's heating effect.

The test insulated chamber is available for use with the servo unit. Having a stainless steel liner, it comes in three sizes 3, 8 and 26 cu ft.

Tenney Engineering, Inc, Newark 5, N. J.



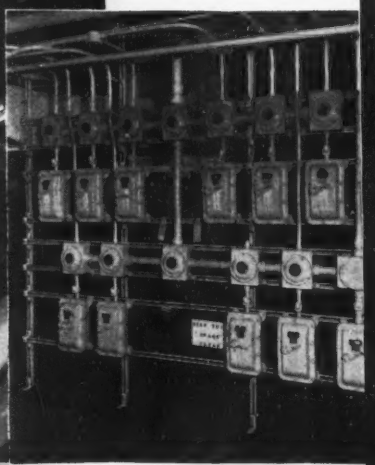
Dc Power Supply

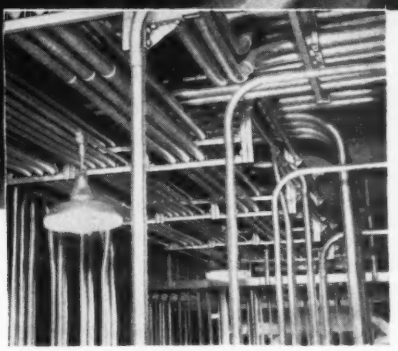
Provides adjustable voltage from 0 to 16 v and continuous output of 8 amp with intermittent loading up to 12 amp. Designed to operate 6-v and

Build

all these things and more with versatile UNISTRUT® METAL FRAMING

UNISTRUT framing and pipe clamps support heavy banks of conduit leading to motors in plant of large pharmaceutical manufacturer.

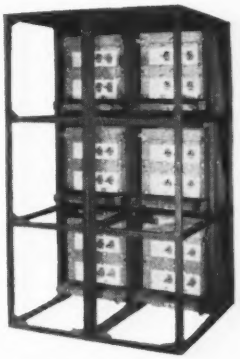




Load center built with UNISTRUT channel and fittings. Framing system's adjustable feature permits quick location of gear to spot desired.

Photo shows how a large power company used UNISTRUT framing and pipe clamps to rack rows of conduit in steam plant installation.

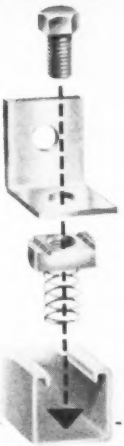
Framework of UNISTRUT channel and fittings support switch gear in typical cubicle installation.



Rack conduit, cable and pipe—
Frame power load centers—
Mount switches, meters and panelboards

Those who use completely adjustable UNISTRUT metal framing know it's easy to handle and quick to erect—that it provides great strength without bulk—that adjustments, changes and additions are easily made at any time.

The UNISTRUT system cuts costs, too. You save time in engineering detailing and eliminate the need for trained erection crews—anyone can build with UNISTRUT channel and fittings. No drilling, no welding, no special tools or equipment—all you need is a hacksaw and a wrench to build wire and cable reel racks, fluorescent fixture supports, transformer vaults, electric motor mounts, bus duct supports and many other structures. It will pay you to try UNISTRUT framing on your next job.



Basic Components of the UNISTRUT Metal Framing System

UNISTRUT Products are Bonderized

Write for NEW

U. S. Patent Numbers
2327587 2329815 2345650
2363382 2380379 2405631
2541908 Other Patents Pending

Free 84-page Pocket Catalog 800

FOR THE MAN ON THE JOB! 84 pages packed with pictures, drawings, ideas and data on how to frame, rack, mount, suspend and support all kinds of electrical equipment with UNISTRUT channel and fittings.

UNISTRUT

The World's Most Flexible All-Purpose Metal Framing

Distributors and Warehouse Stocks in Principal Cities. Consult your Telephone Directories.

UNISTRUT PRODUCTS COMPANY Dept. W3
1013 W. Washington Blvd., Chicago 7, Ill.

Please send me the new Pocket Catalog No. 800, without obligation.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

for true economy in street light control

THE FISHER-PIERCE PHOTOELECTRIC CONTROL

- **LOW *INITIAL* COST**
- **LOW *INSTALLATION* COST**
- **LOW *MAINTENANCE* COST**

The *cost* of control of street lighting includes more than just the price of the control itself. Cost of installation is another major factor. Maintenance costs, if too great, can overcome all other economies.

The F-P Series 63300B Control combines *all three* elements of economy. No control of similar specifications has as low a purchase price. None requires fewer man hours for installation. No other control has equalled the F-P record for maintenance economy.

Fisher-Pierce is able to provide this economy in street lighting control because of its years of experience and its extensive engineering organization. Fisher-Pierce Controls have been proven by the experience of over 700 utilities now using more than 35,000 Fisher-Pierce units.

If you are considering adding to or modernizing your street lighting, be sure to investigate the possibilities of Fisher-Pierce photoelectric controls.

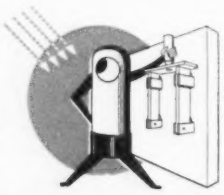
Write for Bulletin 63300B.

FP

The FISHER-PIERCE CO., Inc.
82 Pearl St., So. Braintree, Boston 85, Mass.

EXPORT: PHILIPS EXPORT CORP. 100 E. 42nd STREET NEW YORK 17, N.Y.

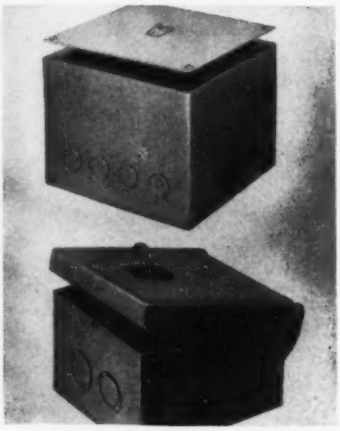
IN CANADA: NORTHERN ELECTRIC CO., Ltd.



12-v auto radios, and for laboratory testing.

Model C-12 consists of a bridge type selenium rectifier; choke input type filter, the output of which is 3% ac ripple at 8 amp; Powerstat for voltage adjustment; and a 6-ft rubber cord. The cabinet is 18-gage steel, measures 12x7x8½ in. and weighs 25 lb.

Electro Products Laboratories, Inc, Chicago 40, Ill.



Pull Boxes

Manufactured from sheet steel, are fabricated and welded in compliance with Underwriters' Laboratories specifications. Knockouts are easily removable and substantially dustproof due to specially designed dies, it is claimed.

Type A, the hinged cover box, is designed for electrical cutouts, signal, telephone, junction and pull box applications. It is equipped with a flush ring and friction catch. Stock sizes are 4½x5x3 in. to 24x18x6 in.

The screw cover box, type SC, is especially suitable for junction and pull box use and is available in sizes from 6x6x4 in. to 18x12x6 in.

Keystone Manufacturing Co, Center Line, Mich.

High Speed Tap

For tapping highly heat treated steel parts of various alloys and stainless steel. It is claimed to require low torque for cutting threads, about 50% of the torque required for cutting threads with a standard tap. The broach may be resharpened on a tool and cutter grinder.

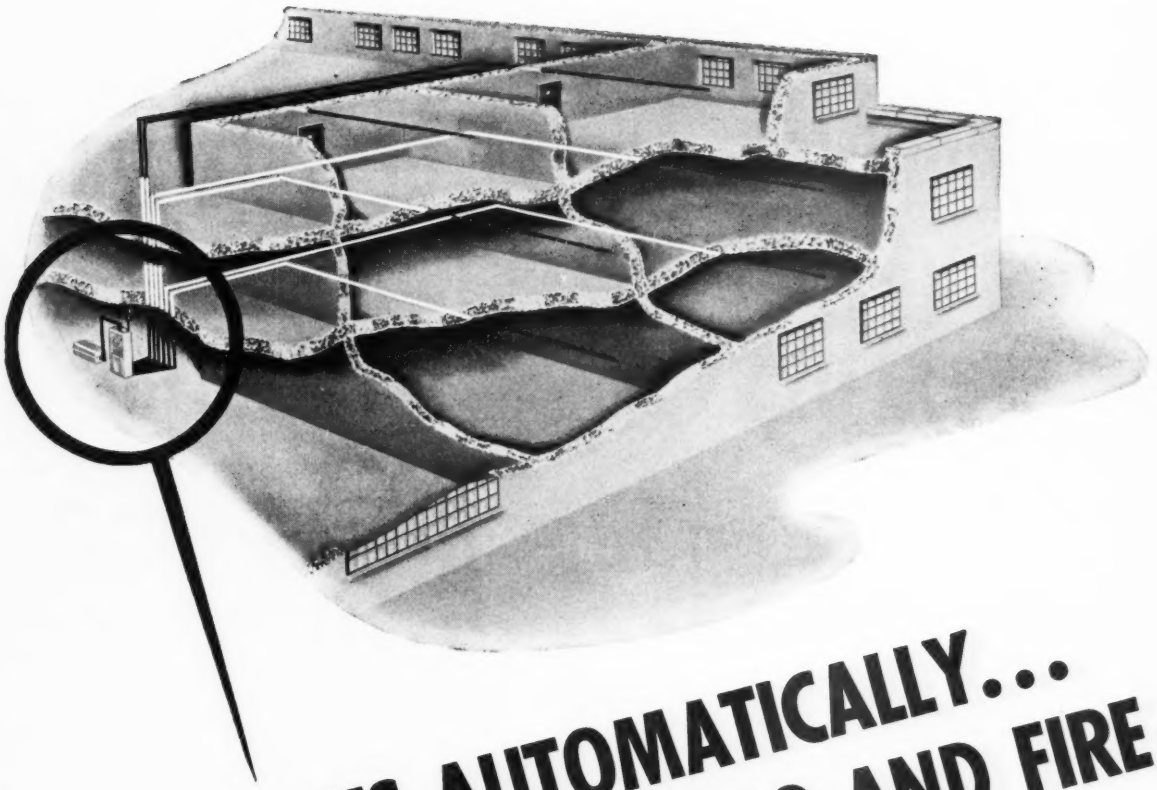
These tools are made in standard

(*Continued on page* 186)

The World's Most Flexible All-Purpose Metal Framing

Address _____

City _____ Zone ____ State _____



DETECTS AUTOMATICALLY... SMOKE, SMOLDERING AND FIRE

at any location in your plant or warehouse!

Each fire hazard point gets highly efficient, round-the-clock fire watchman service simultaneously, when a building is completely protected with a modern, fully approved C-O-TWO Automatic Smoke Detecting System.

The first whiff of smoke sets off an alarm, based on an exclusive operating principle . . . no chance of smoke, smoldering or fire spreading . . . instantly, the air conditioning shuts down, doors and dampers close, operating equipment stops and fire extinguishing systems actuate . . . a truly automatic fire watchman.

Four types of smoke detectors and several installation arrangements are available to fit your particular needs . . . single space systems, double space systems, multiple space systems, air conditioning duct systems . . . all function by drawing continuous air samples through simple piping to a smoke detector.

Actual fire tests made by the Underwriters' Laboratories, Inc. show that fire detection with this type of smoke detecting equipment is much quicker than other methods . . . because usually there is smoke or smoldering before flames break out.

Remember fire doesn't wait . . . so, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning economical, fully approved fire protection facilities. Write today for complete free information . . . no obligation.

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

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Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

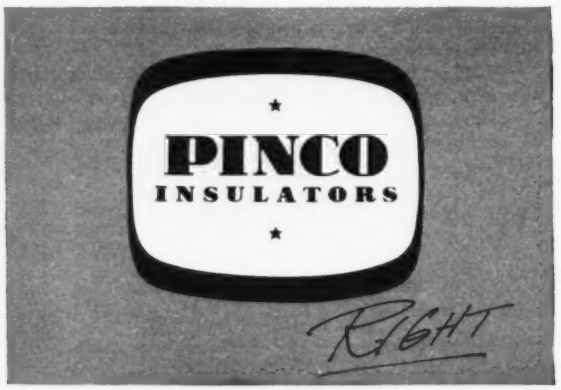
A SUB STATION DESIGN ENGINEER ASKS—

"We're switch and

HERE'S OUR ANSWER:

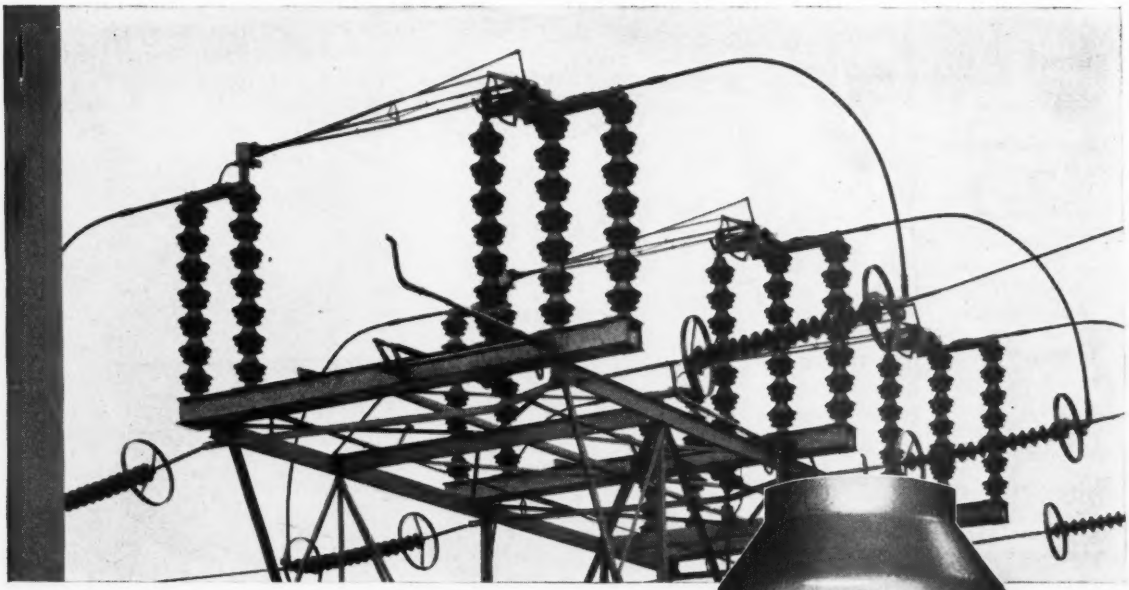
Yes sir! For example, these Pinco 735 units installed at 220 KV by a large eastern utility back in 1929. Operating conditions have been rugged, but these insulators in seven unit stacks have given *twenty-four years of continuous, trouble-free performance* . . . stacks of evidence that Pinco 735's are right *for* the job . . . right *on* the job!

Here's a close-up of one of our master type jigs in which the 735 unit is assembled. This operation assures exact bolt hole alignment—also cap and pin mounting surfaces are within 3/10,000 of an inch of parallelism.



NO. 10 IN A SERIES

interested in higher voltage bus unit operation. Do you have a service record on 220 KV?"



Rugged porcelain—a balanced design with larger second and center shells—the extra strength and extreme accuracy of assembly . . . all contribute to the trouble-free performance of Pinco 735 switch and bus units.

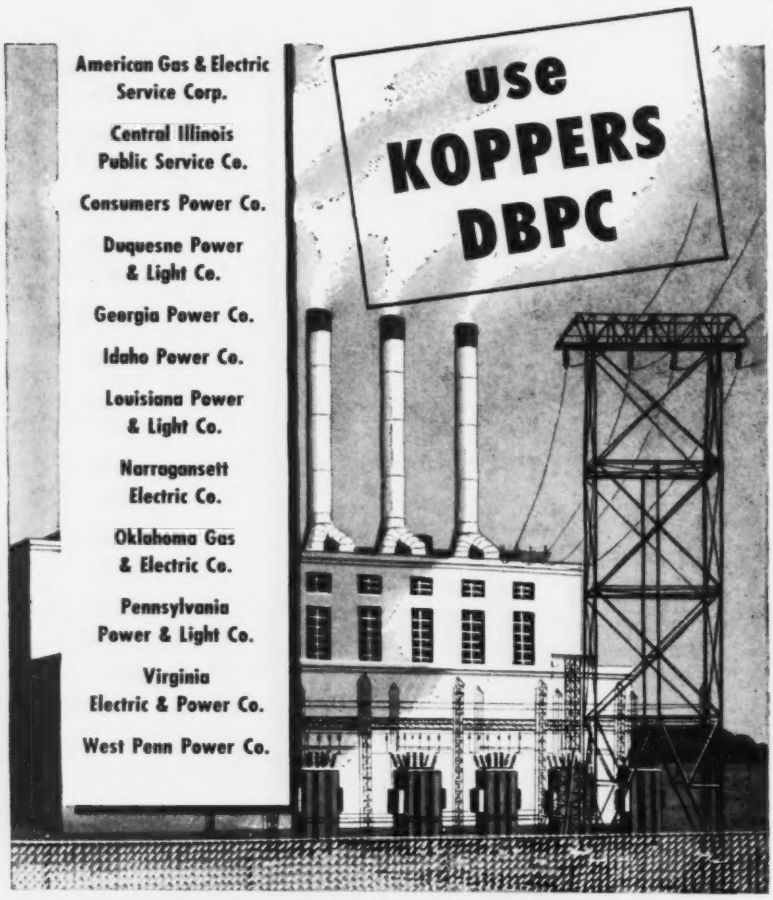
See Pages 112 to 123 in Pinco Catalog No. 49 for complete electrical and mechanical specifications covering all Pinco Switch and Bus Insulators. Do you have a copy? If not, write us.

The Porcelain Insulator Corporation
LIMA, NEW YORK

ON THE JOB—

Sales Agents: JOSLYN MFG. & SUPPLY CO.
Offices in Principal Cities

Increase transformer oil life like these companies do . . .


American Gas & Electric Service Corp.
Central Illinois Public Service Co.
Consumers Power Co.
Duquesne Power & Light Co.
Georgia Power Co.
Idaho Power Co.
Louisiana Power & Light Co.
Narragansett Electric Co.
Oklahoma Gas & Electric Co.
Pennsylvania Power & Light Co.
Virginia Electric & Power Co.
West Penn Power Co.
use KOPPERS DBPC

HIGH-LOAD TRANSFORMERS require a sludge-free insulating oil. Di-tert-butyl-para-cresol greatly increases the resistance of transformer lubricating oils to oxidation and keeps sludge formation to a minimum. It assures longer oil life and more efficient transformer performance.

Accelerated oxidation tests have proved that new transformer oil treated with 0.3% of DBPC will last *14 times longer* than untreated oil. Reclaimed oil will last longer, too, when treated with DBPC. Although badly deteriorated and heavily sludged, used oil can be restored by treatment with fuller's earth and DBPC so that it will actually outlast brand new uninhibited oil!

DBPC is also available in an oil solution called IMPRUVOL 20. Either of these inhibitors can be used in transformers and circuit breakers. Write us for additional information.

KOPPERS ®

Koppers Chemicals

KOPPERS COMPANY, INC.
Chemical Division, Dept. EW-3233
Koppers Building, Pittsburgh 19, Pa.

sizes from No. 4 to No. 12 machine screw size, and from ¼- to 1½-in. fractional sizes. Both National Course and National Fine pitches are available.

Shearcut Tool Co, Reseda, Calif.

Safety Accessory

Called Short-O-Matic, disconnects the appliance's outlet plug when a short circuit occurs in the load side of the outlet. It is rated at 500 w.

When an appliance short occurs, the accessory expells itself out of the outlet. This action is claimed to be sufficiently fast to prevent blowing of fuses.

Aldane Industries, Inc, Woodside, N. Y.

Work Positioner

Is offered as a bench model and a pedestal model with accessories to make it inclinable and operable in-

(*Continued on page* 190)

YOUR SWITCH and BUS INSULATORS WILL NEVER HAVE TO TAKE THIS PUNISHMENT

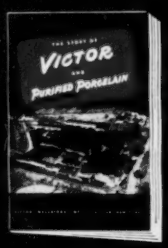
. . . but they can if they're made of

VICTOR PURIFIED PORCELAIN

Left: Victor No. 729 Stacking Unit undergoing cantilever test to determine ultimate strength.

It's pretty satisfying to know that the insulators on your system can take more punishment than they'll ever get in service. That's why more and more power men specify Victor *Purified Porcelain* insulators. Laboratory tests show they have unequalled cantilever, torsion, tension, and compression strength, perfection of glaze and durability under all service conditions. For complete engineering data, send for Bulletin No. 5.

VICTOR NO. 742 (NEMA TR-NO. 7) SWITCH and BUS INSULATOR



FREE BOOKLET gives you the full story on how Victor insulators are made—how and why *Purified Porcelain* was developed. Write us for your copy.

Specify VICTOR INSULATORS!

VICTOR INSULATORS, INC., VICTOR, N. Y.

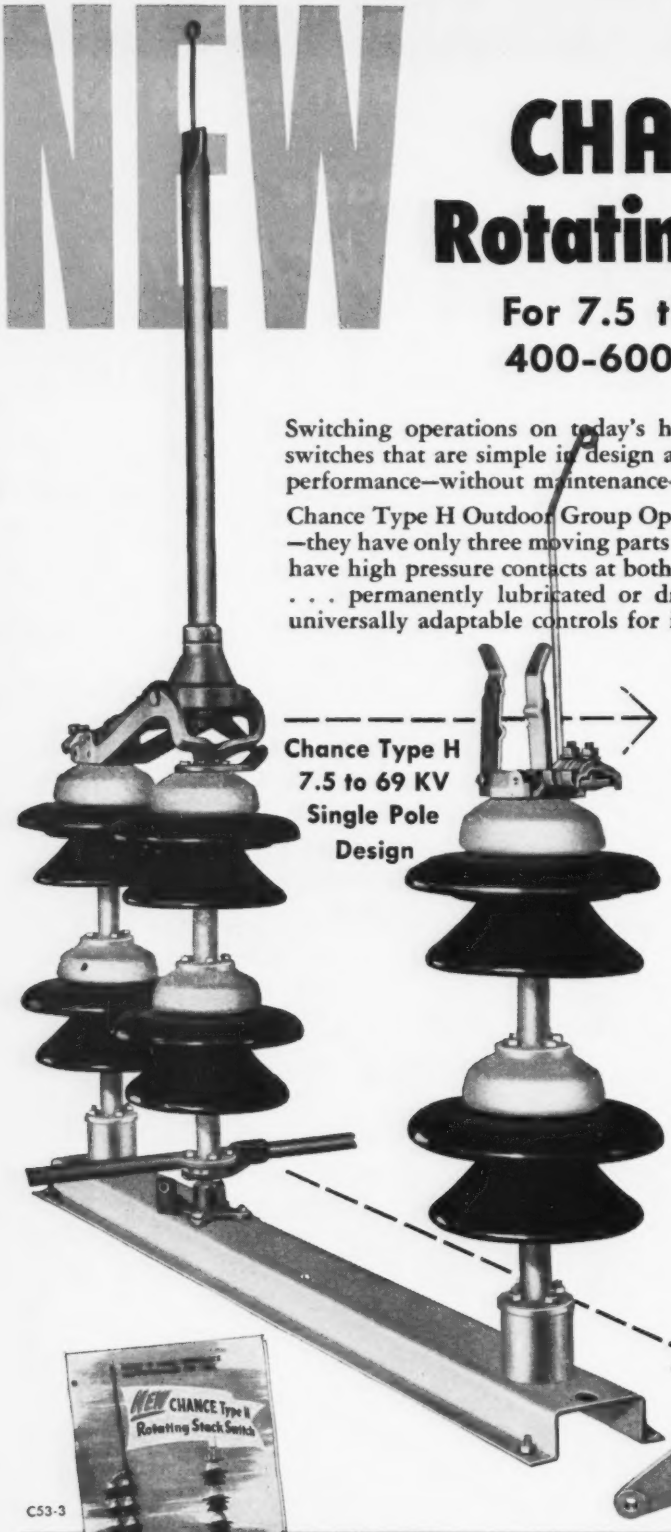
Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain

NEW CHANCE type H Rotating Stack Switch

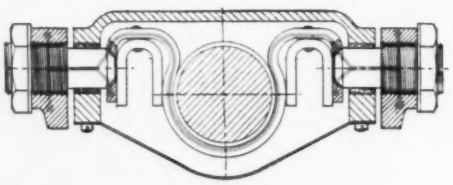
For 7.5 through 230 KV
400-600-1200 Amperes

Switching operations on today's heavily loaded power systems demand rugged switches that are simple in design and have the ability to give years of unfailing performance—without maintenance—under any climatic condition.

Chance Type H Outdoor Group Operated Airbreak Switches meet these demands —they have only three moving parts . . . break heavy ice accumulations with ease . . . have high pressure contacts at both ends . . . completely enclosed hinge connection . . . permanently lubricated or dry type ball bearings and are equipped with universally adaptable controls for installation on any type of structure.



Chance Type H 7.5 to 69 KV Single Pole Design



Continuous Hinge Contact

The contact at the hinge end of ALL Type H Switches is held under constant high pressure in both open and closed position. Contacts are never released—thus contact area is never exposed to oxidation or corrosion. This diagram shows the current path at the hinge end of the switch. The heavy U-shaped beryllium copper pressure springs carry no current, support no weight. Contacts are completely enclosed.

Universal control for easy installation

Chance Type H Switches are equipped with a universal control crank, with screw point recesses at 10° intervals. This crank makes it easy to adjust the controls to within 5° of any position and permits the control mechanism to be readily adapted to any type of structure.

C53-3

Write for complete information on these new group operated switches.

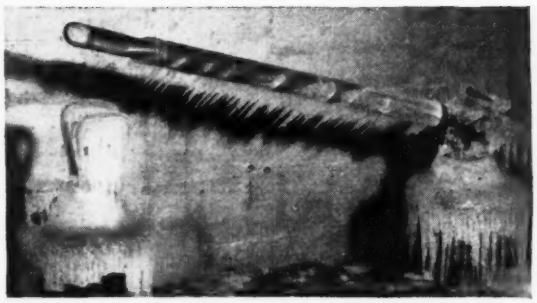
A·B·CHANCE CO·

CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

ABC INDUSTRIES

Simple in Design... Superior in Operation!

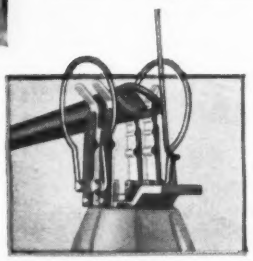
- ONLY 3 MOVING PARTS
- ENCLOSED NO-BREAK HINGE CONTACT
- EASY TO INSTALL ON ANY TYPE OF STRUCTURE

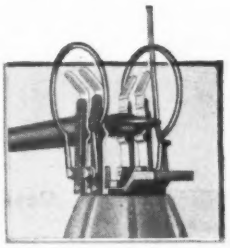


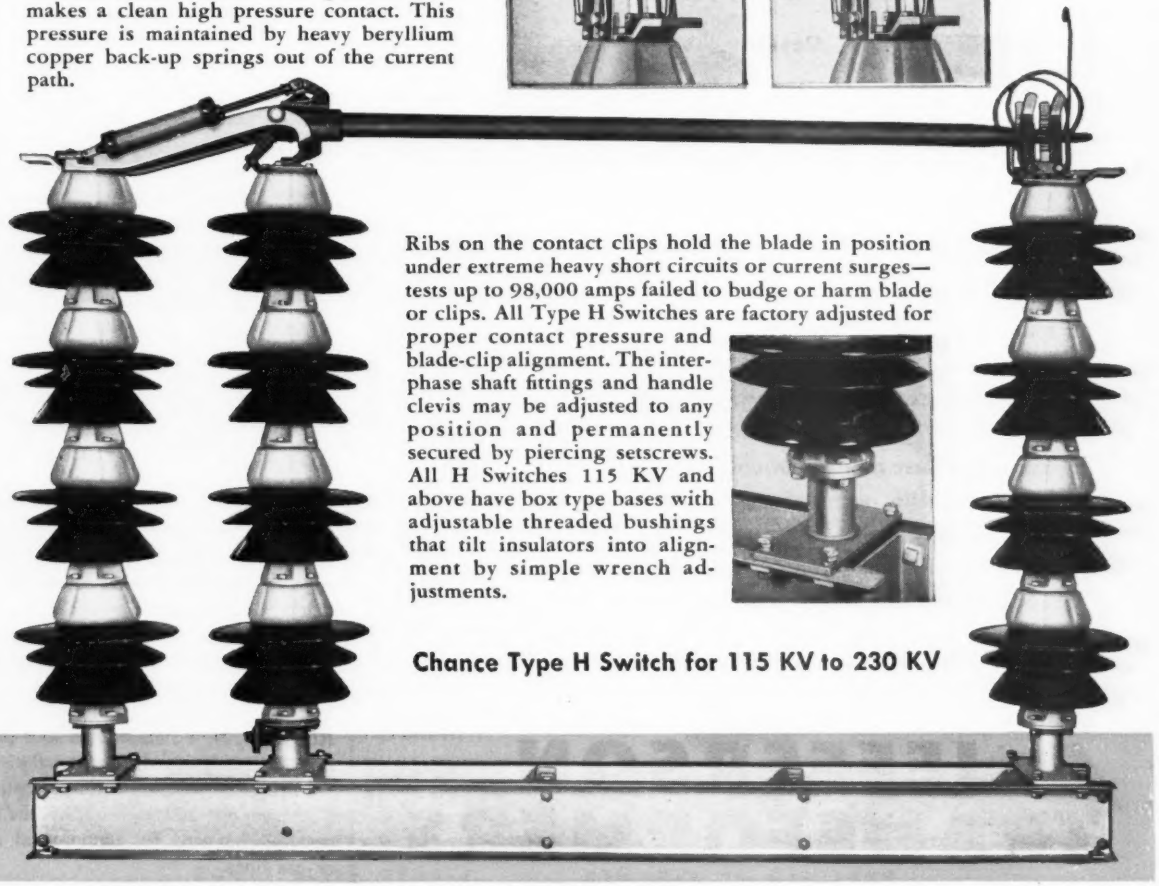
All-weather Operation—This laboratory photograph shows how ice accumulations were easily broken during dynamometer ice tests made on a 161 KV Type H Switch. Tests were made with a steady pull to simulate motor operation. Chance Type H Switches have sufficient leverage to open and close them under a 1" accumulation of hard, clear, bubble-free ice, made with distilled water slowly frozen to approximate the most severe conditions.

Rotation of Blade Gives High Pressure Contact

The blade closes with a rotating motion that makes a clean high pressure contact. This pressure is maintained by heavy beryllium copper back-up springs out of the current path.







Ribs on the contact clips hold the blade in position under extreme heavy short circuits or current surges—tests up to 98,000 amps failed to budge or harm blade or clips. All Type H Switches are factory adjusted for proper contact pressure and blade-clip alignment. The interphase shaft fittings and handle clevis may be adjusted to any position and permanently secured by piercing setscrews. All H Switches 115 KV and above have box type bases with adjustable threaded bushings that tilt insulators into alignment by simple wrench adjustments.

Chance Type H Switch for 115 KV to 230 KV

What type TRANSFORMER do you need?

High Voltage Transformer.
Transformer with coil-protecting housing and leads.
Fully Enclosed Transformer with wiring compartment and circuit breaker.
Enclosed Transformer with receptacle, "off" and "on" switch and variable voltage control switch.
JEFFERSON ELECTRIC
Transformer for horizontal mounting.
Plug-in Transformer.
Open Type Transformer with mounting and terminal lugs.
Watertight Transformer.

STANDARD, SEMI-STANDARD, SPECIAL?

Jefferson makes millions of transformers yearly including many of standard design and application — many that are variations of standard with changes in mounting and terminal arrangements, — and a wide range of designs for special and very unusual applications.

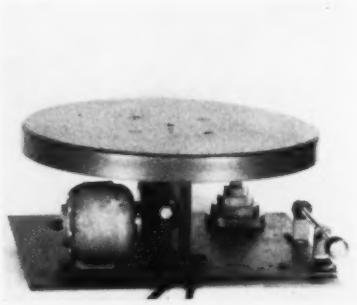
Because of 35 years of transformer design and manufacturing experience, you are assured not only engineering design excellence but uniform quality of manufacture for long reliable performance.

From the inception of design to the final product, all steps are carried through in the complete modern Jefferson plant. Come to "Transformer Headquarters" with your next problem.

JEFFERSON ELECTRIC COMPANY
BELLWOOD, ILLINOIS

Refer to Catalog in Sweet's Product Design File, or write for full information.

JEFFERSON TRANSFORMERS



termittently. It is said to carry a load of 300 lb and move at speeds adjustable upward from ¼ rpm, operating from an 110-v, 60-cps convenience outlet.
All-State Welding Alloys Co, Inc, White Plains, N. Y.

MORE NEW PRODUCTS
about which you should know

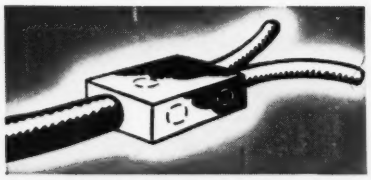
Photoswitch Inc, has an **electric timer** for intervals from $\frac{1}{20}$ sec to 4 min. It operates from 115 or 230-v, 50 to 60-cps supply, consuming 25 w, and has two single-pole, double-throw switches . . . Electric Motor Corp, Division of Howard Industries, Inc, Racine, Wis., announces a line of **shaded pole motors** from $\frac{1}{25}$ to $\frac{1}{11}$ hp, designed for fan duty in refrigeration and air conditioning applications.

Del Protective Coatings, New York 17, N. Y., announces a synthetic rubber **caulking compound** for sealing concrete and metal ducts, conduits floors, etc. The black paste is claimed to cure without shrinking . . . Phillips Control Corp, Joliet, Ill., has introduced a **relay** characterized by its compactness, capacity and sensitivity.

Leo R. Leary, Buffalo 20, N. Y., has a porcelain **insulator cleaner.** It is mopped on, permitted to dry a few minutes and wiped off . . . The Barry Corp, Watertown 72, Mass., announces two all metal **vibration isolators** designed to eliminate loss of efficiency due to damper packing.

Pass & Seymour, Inc, Syracuse 9, N. Y., have a new line of **locking plugs** and receptacles with ratings up to 20 amp and 600 v . . . Dollinger Corp, Rochester, N. Y., announces four **pipe line filters** designed for installations requiring 40-psi maximum pressure. Featuring one-bolt accessibility, the filters can be used for compressed air or gas lines.

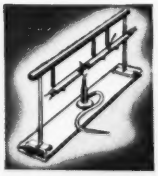
How to get longer life out of your portable cords and cables!



1 USE junction or distribution boxes for making multiple power connections in working places.

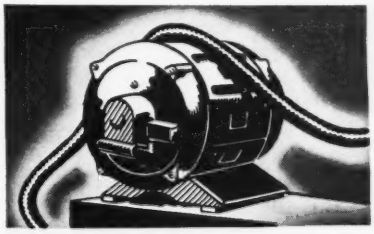
2 PROTECT cables with fuses or circuit breakers of the proper rating for the service. Make sure that circuit breakers will operate properly.

3 PROTECT cables from being run over by heavy equipment. Running over the cable a few times may not cause immediate failure, but may do internal damage which will shorten its life. If the cable must be run across an aisle, place boards on either side as one would for a hose. If it is in use for only a short time, it should be thrown over the truck.

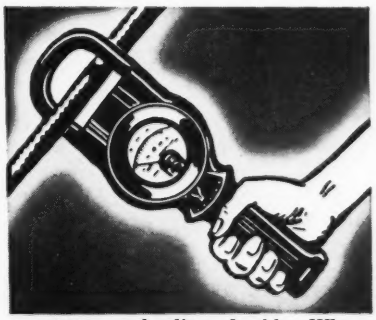


4 USE flame-resistant cables wherever possible.

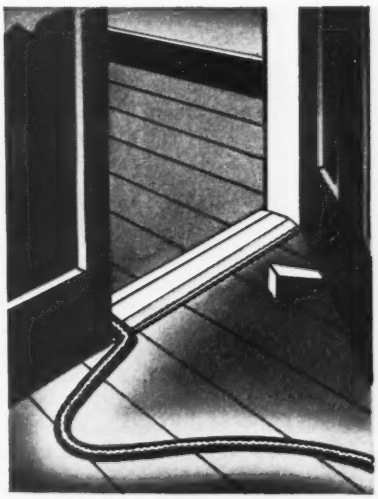
5 DO NOT have portable cords and cables running over steam pipes or other heat-transmitting equipment.



6 KEEP cables away from sparking motors and high voltage equipment. The ozone generated by sparking commutators attacks rubber jackets, causing cracking.



7 AVOID overloading of cables. Where possible, use I.P.C.E.A. recommended current ratings.



8 AVOID dragging portable cords around rough edges or sharp corners. Bruises and cuts hasten deterioration of the jacket. Never yank cords to remove kinks or loosen them when caught on a projection.

9 AVOID running portable cables on pulleys or drums too small for the size of the cable; observe recommended I.P.C.E.A. minimum diameters.

10 KEEP cords away from oils and greases. If they do get into oil, they should be wiped off as soon as possible. Avoid having cords lie in pools of water, chemicals or grease.

11 BUY cables that can carry the required current without overloading or overheating. They should be flexible (have sufficiently fine strands) for the intended use.

FOR FREE REPRINTS OF THIS PAGE, WRITE TO ADDRESS BELOW.

UNITED STATES RUBBER COMPANY

U.S. RUBBER
SERVING THROUGH SCIENCE

Electrical Wire and Cable Department

ROCKEFELLER CENTER • NEW YORK 20, NEW YORK

LETTERS TO THE EDITOR

50,000-kw Remote Control

To the Editor:

With reference to the statements made in the Jan. 7 and Feb. 9 issues regarding the largest remote controlled hydro-electric installations, I call your attention to the 50,000-kw Spray Plant of the Calgary Power, Ltd. This plant is considerably larger than the 37.5 and 35-Mw stations mentioned in the above issues and is the largest remote controlled plant, as far as I can learn. Incidentally, this system has eight plants of this type, all of which are unattended during normal operating conditions.

Arnold Rich
Consulting Engineer
Fort Worth, Texas

Figures on Aluminum

To the Editor:

Referring to Mr. Harold W. Adams letter in your Dec. 29 issue "A Bit More on Connectors," it is of course quite true that aluminium-copper fittings are more expensive than plain copper-copper fittings, but every effort is being made to reduce their cost. Furthermore, in the case of HT distribution lines, the cost of fittings is such a small proportion of the total cost of the lines or even of the conductor cost, that the extra cost of aluminium-copper fittings is of no significance.

LT distribution lines involve a much larger number of aluminium-copper tappings if copper service wires are used but, nevertheless, as the following simple calculation indicates, this extra cost is a very small proportion of the saving on the conductor.

Let us assume that an LT line of 4 conductors with 7/.136-in. copper (0.1 sq. in.) or the electrically equivalent 7/.173-in. all-aluminium, the prices per mile of which as given below are approximate. We can also assume two house services every 50 yards involving four aluminium-copper low current tappings. As far as the U.K. is concerned, they might be as much as 3/-[$.42] each more expensive than a standard copper tapping. Per mile the extra cost of tappings would therefore be 35(4x3/-)= £21.0.0d [35(4 x $.42)=$58.80]

7/.136 copper costs 4x£329=£1316 per route mile

7/.173 equivalent all-aluminium costs 4 x £156=£624 per route mile

Saving in favour of all-aluminium= £692 per route miles [$1937.60]

This shows conclusively that there is nothing in the argument that the extra cost of aluminium-copper fittings is an objection. Furthermore, no greater labour cost is involved. In the case of HT distribution lines, where the number of fittings is considerably less, their extra cost has even less significance. In the case of terminals involving a cone connection, it is admitted that there probably would be a slightly increased labour cost, but very little.

It is true that the above estimate is based on U.K. prices but, presumably, the comparison is substantially the same in the United States.

Various Area Boards of the British Electricity Authority are using aluminium service wires, insulated where necessary, instead of copper, so that no extra aluminium-copper fittings are required and the aluminium-copper junction takes place inside the house at the cut-out where it is protected from the outside atmosphere; the only extra precautions taken are to see that the clamping screw is blunt ended and that some neutral grease is well smeared around the junction.

Finally, economy is obviously no use unless accompanied by reliability and, as already explained in previous correspondence in your paper, suitable designs are giving excellent service in the U.K., and also abroad, under more rigorous conditions.

C. H. E. Ridpath
Chief Electrical Engineer
Aluminium Wire & Cable Co, Ltd
London, England

Electricity for the Blind

To the Editor:

Thank you for the article on the work that Floy May Ingle did in Talladega with the blind students.

We appreciate very much the publicity you have given us and we are hoping that we will have another McCall winner this year for you to write up.

Edith Hitchcock
Home Service Director
Alabama Power Co
Birmingham, Ala.

Accelerated Amortization

To the Editor:

Your editorial in the Feb. 23 issue on accelerated amortization cites a decision of this commission and observes, "It prescribes equalization for financial and rate base purposes. Thus no relief is allowed for the greater risk assumed by the stockholders."

The record in this case discloses first, the decision of the commission was not one on its own motion, but was one which resulted from the filing of an application by Georgia Power Co; second, the tax equalization prescribed was the method suggested by the company in its application to the commission; third, the company wanted to know and had a right to ask what accounting treatment, and more important, what rate making treatment was to be given the matter in future rate decisions before they elected to use the necessity certificates granted. To merely specify some accounting treatment would not suffice, unless such accounting treatment was governed by treatment for rate case purposes.

The decision stipulated that the amount of the deferred income tax accrual would be deducted from the rate base. The accruals are built up out of operating expense. They represent cash from such expense deductions, and not funds invested by security holders.

It is not clear what greater risk is assumed by the stockholder when the tax deferral dollars have been provided through operating expenses and not from risk capital invested in the enterprise.

Actually, there is a benefit to the stockholder. According to the evidence given by the company the accelerated amortization will provide a maximum of some $19,500,000 of funds which will be needed for capital expenditures. This source of capital funds should reduce the risk assumed by stockholders and Georgia Power Co has voluntarily elected to claim the amortization authorized by the Certificates of Necessity subsequent to the decision of the commission.

Matt L. McWhorter
Chairman
Georgia Public Service Commission
Atlanta, Ga.

Meet D. F. Shankle

Westinghouse Electric Utility Engineer*, who, on the next few pages, has some important apparatus considerations relative to the continuing problem of —

Well-regulated voltage . . . and your system revenue

*Mr. Shankle is an authority on utility equipment. He has spent many years in close association with apparatus design—and application of that apparatus to special situations. On the following pages, Mr. Shankle will introduce you to other experts of the Westinghouse Utility team, who have some practical answers to your voltage regulation problems.

"Voltage regulators, of course, are of primary importance in considering well-regulated voltage — so let's talk to 'Mike' Meixner, Manager Regulator Sales."

YOU CAN BE **SURE**... IF IT'S

"Simplified Westinghouse Controls and Tap Changers—your starting point for better regulation!"

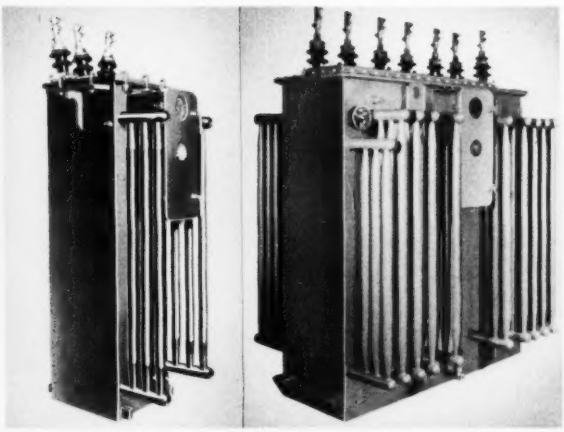
The inherent simplicity in design of these two important regulator components is your assurance of well-regulated voltages—from generating station to rural lines. The exclusive, new, all-electric control panels on Westinghouse Induction Regulators—the direct-drive tap changers on step regulators—give highly accurate regulation with an absolute minimum of maintenance. Westinghouse Regulators, including power, urban and rural types, are designed to accurately fit your exact requirement—whatever it may be.

The power line, for instance, includes the "SU" induction regulator for the lower voltage ranges. It also includes the "ST" triplex for 3-phase application. Both types feature the simplified all-electric control panels for smooth, sensitive control—with just a simple dial adjustment.

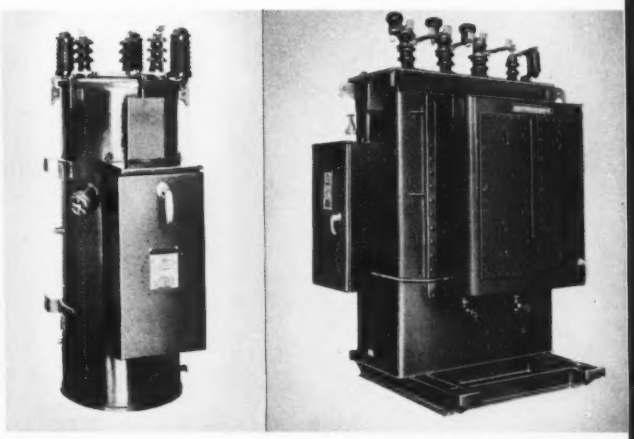
In the higher voltage ranges where regulation must be economically maintained, the type "URS" step regulator with Geneva direct-drive tap changers more than meets the requirement. Fewer moving parts assure accurate regulation—less maintenance!

Remember—all *three* types in the Westinghouse line of power regulators, as well as the many types of induction and step regulators available for urban and rural application, are designed to give you the utmost in well-maintained voltages.

Full details are contained in Catalog Sections 47-310, 47-350, 47-410 and 47-430. J-10395



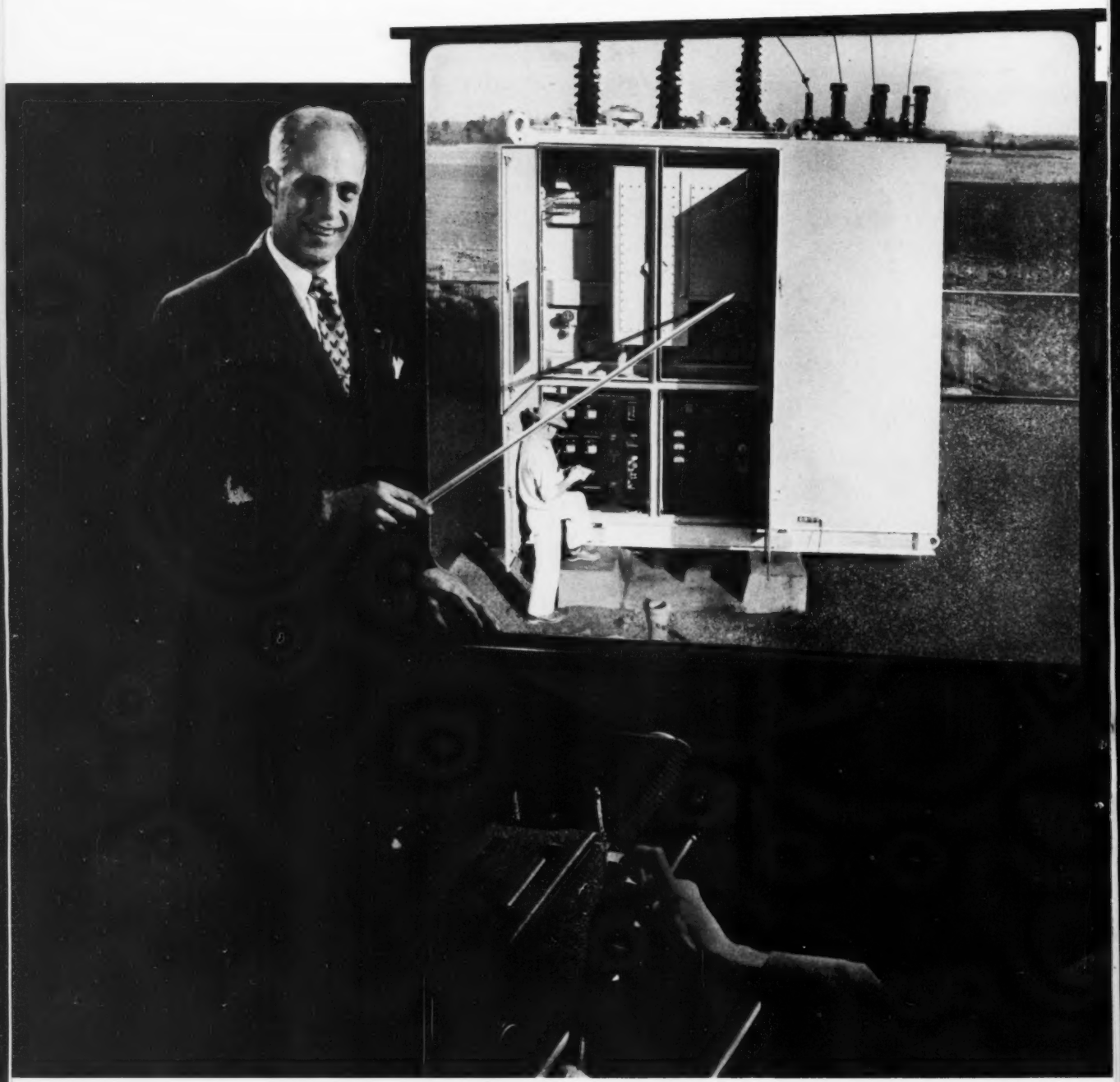
Induction regulator types "SU" and "ST" utilize new, all-electric control for simple dial adjustment, easy accessibility.



Step regulator types "URL" and "URS", with direct-drive tap changer, offer fewer moving parts, less maintenance.

Westinghouse

"To 'Tex' Brannan of the Transformer Division, 'built-in regulation' is synonymous with 'economical regulation'."



YOU CAN BE **SURE**...IF IT'S

"'CSP' Power Transformers . . . a logical answer to the cost-of-regulation problem"

When you're selecting voltage control for substations, two factors narrow your choice: degree of control required, and cost. For single-feeder substations, "CSP"' Power Transformers simplify that problem.

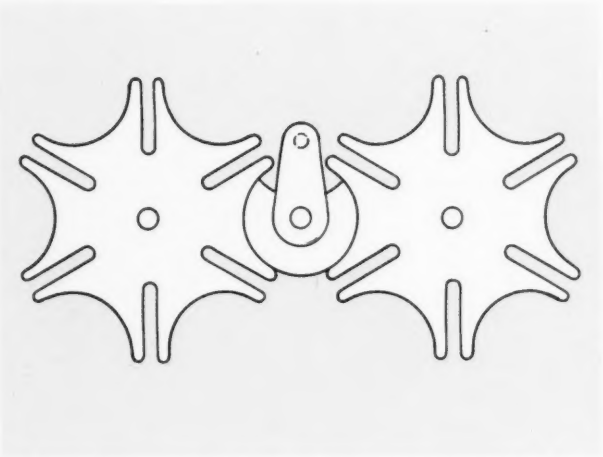
Along with complete protective and metering equipment, "CSP" Power Transformers have automatic under-load tap changers, designed and built into the unit. Because they are engineered and manufactured together, a degree of coordination is achieved that would be hard, if not impossible, to equal in any field-erected station. It's a natural advantage that results in the best possible regulation.

"CSP" Power Transformers offer two distinct cost advantages, too.

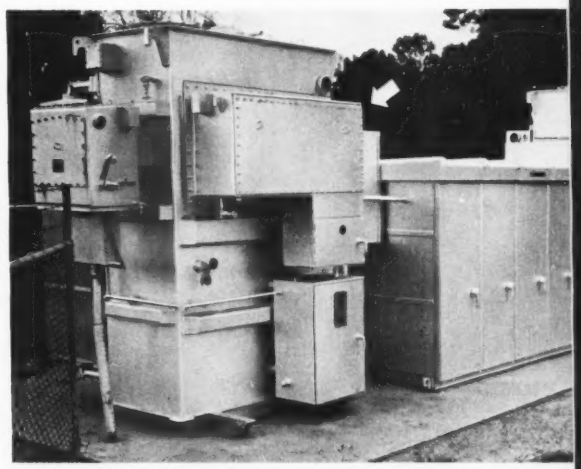
Installation cost is lower because they require only one foundation and one set of connections. Compare this with the thirty to forty items that must be connected in field-erected stations.

Maintenance costs are lower, too. The type "URS" tap changer is unusually maintenance-free because of the basic simplicity of its design. The direct-connected drive eliminates latches, springs and shock-absorbing devices. The Geneva gear action of the moving contacts causes smooth acceleration and deceleration, with high speed during the arcing cycle. This minimizes arcing; provides shockless operation.

It all adds up to the best level of voltage control obtainable with step-type regulation, plus installation and maintenance savings no other equipment can equal. In addition, neat appearance and inherent safety often overcome community objections to substations, solving costly real estate and landscaping problems. Your Westinghouse representative will be glad to discuss specific applications, or write direct for Booklet B-4692. J-70681.



This is the Geneva gear that guides the moving contacts of the tap changer. It assures shockless acceleration and deceleration with high speed through the arcing cycle. The result is a virtually maintenance-free drive. Tests have been conducted, proving more than a million operations without serious contact wear.



Automatic under-load tap changers can help cut regulation costs in your multi-feeder units, too. The above double-ended station has its switchgear factory coordinated with two 3,000-kva transformers. Arrow indicates tap changer compartment of the transformer in the foreground.

Westinghouse

"Here's Bill Sumner of the Transformer Division with a workable approach to an old problem:"

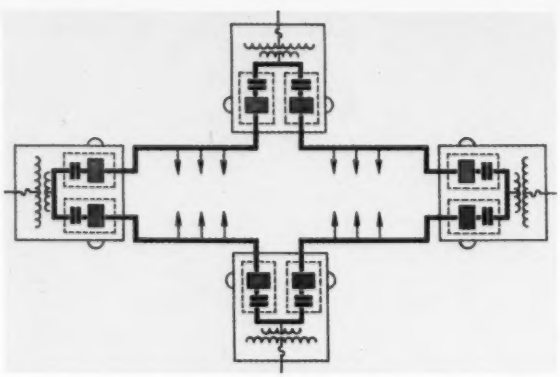
"Flicker-free service made practical with 'CSPB' Transformers"

It's generally agreed that an effective way to stop service voltage complaints is to hook up distribution secondaries in parallel. But even though this can hold instantaneous dips within acceptable limits, it creates problems in fuse coordination and cascading black-outs that usually outweigh the advantages. That's why Westinghouse developed "CSPB®" Transformers.

In banking with "CSPB" Transformers, secondaries are interconnected through two built-in breakers, one to serve each direction that the secondaries extend. This provides signal-light indication of overworked sections, then automatically isolates the area if the overload becomes dangerous, or the section is faulted.

Because of this feature, "CSPB" Transformers continue to serve the bank, even though one section may be out. This makes it unnecessary to install excess reserve capacity . . . and as load grows or shifts, capacity can be added easily by simply tying in more transformers. With complete lightning and thermal protection built in, installation costs are low. With only one hookup instead of three or four, savings in crossarms, copper and labor are substantial.

No matter how effective regulation may be up the line, it's the service level where voltage problems are *customer* problems. "CSPB" Transformers make it practical and economical to install the type of system that eliminates these problems. Talk it over with your Westinghouse representative, or write for Booklet B-4310A. J-70682



Banked Secondary System using "CSPB" Transformers provides reserve capacity . . . prevents cascading through system.

YOU CAN BE **SURE**... IF IT'S

"This is Bill Wheeler, Switchgear Distribution Apparatus Sales, to discuss the economic importance of capacitors in regulating voltage."

"Westinghouse switched capacitors offer hidden opportunities for better voltage regulation"

If you serve spread-out areas, there may be great opportunities for you in Westinghouse Autotrol* . . . automatically switched capacitors. Many utilities with problems similar to yours are using Autotrol to improve voltages during heavy load periods. Autotrol costs as little as $5.66 per kvar and it frequently returns its first cost in a short time by reducing losses and opening up more system capacity.

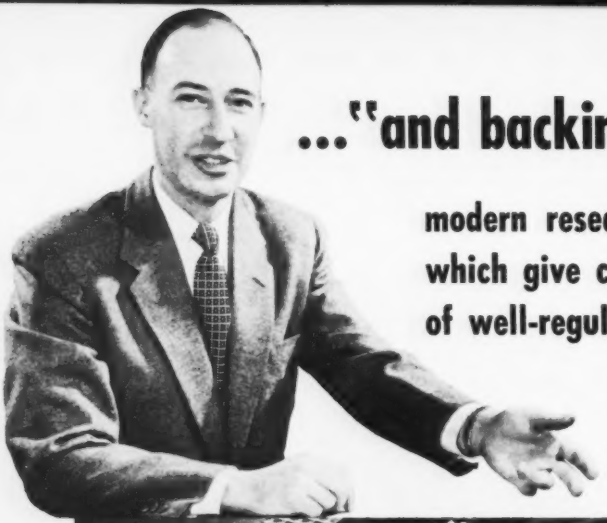
The first step in making these low-cost improvements is a study of your system. Westinghouse has a wealth of data on capacitor applications which is available to you. We make a complete line of capacitor equipment, including non-switched units which can easily be converted to Autotrol, if desired, at a later date.

Autotrol switches in automatically when the system needs kvar. Switching can be controlled by a simple voltage, current or time device. We can help you decide which is best for your application. The Westinghouse switching equipment is the simplest and most dependable available today.

Think about your system and your regulating problems. Then have Westinghouse tell you more about Autotrol. Write now for Descriptive Bulletin 49-310 and Reprint 4844. J-60813.

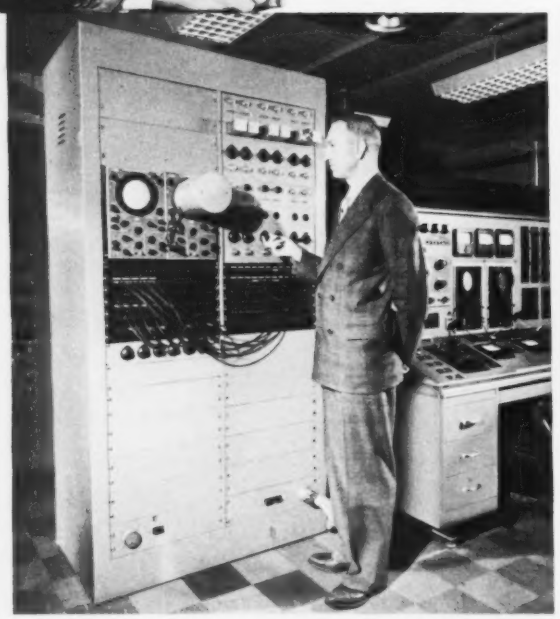
*Trade Mark

Westinghouse

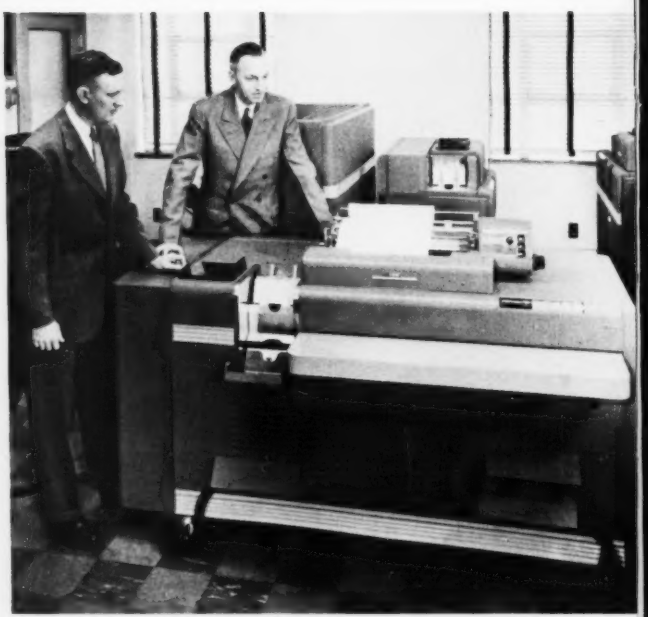


..."and backing up these products are...

modern research computers like these — which give continuing assurance of well-regulated voltages!"



Analog computers—"Anacoms", as Dr. Harder of the Analytical Section calls them, make possible the solution of problems that would take hours, weeks or even years to solve by ordinary means.



Digital computers—Mathematical operations are performed by counting pulses on a counting wheel, relays or electronic tubes—in effect, a complex version of the modern office machine.

Both the Analog and Digital computers combine at Westinghouse to solve system problems in (1) basic equipment design, (2) application of equipment to special situations such as maintaining well-regulated voltages.

For example, the Analog computer has been used to determine transient voltages which occur when switching capacitors, and to limit these voltages to reasonable values by proper application of equipment.

Such data and equipment add to your assurance of satisfied customers.

If you have problems of maintaining well-regulated voltage—call your local Westinghouse representative . . . he's equipped to discuss and help you with your specific situation. Copies of this insert or the product booklets referred to on previous pages can be obtained by writing direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. CP-1001

YOU CAN BE SURE...IF IT'S Westinghouse

NEWS ABOUT PEOPLE

Lansing T. Smith Advanced . . .

. . . to general manager of Gulf Power Co to succeed L. C. Parks, who assumes post of assistant to the president

LANSING T. SMITH

Lansing T. Smith, vice president of Gulf Power Co, has been elevated from assistant to the general manager of the utility to the post of general manager. He succeeds L. C. Parks, who has been made assistant to the president. Parks, who joined Gulf Power in 1935, will continue as a vice president and director of the utility.

With Gulf Power since 1926, Smith was appointed to the assistant's position in 1949 and vice president in 1951. Prior to joining Gulf Power, he was associated with Alabama Power Co and Tennessee Electric Power Co, where he served as a division manager. Tennessee Electric was acquired by Tennessee Valley Authority.

Caples Heads Anaconda Aluminum

Russel B. Caples, manager of Anaconda Copper Mining Co's Great Falls (Mont.) Reduction Department, has been elected president and director of Anaconda Aluminum Co. The announcement was made by Cornelius F. Kelley, chairman of the board of Anaconda Copper, the parent company.

Caples succeeds Francis O. Case, who recently resigned to become president of the Glen Alden Coal Co. Case was appointed president when the aluminum firm was formed in the fall of last year. Prior to assuming the presidency, he served for four years as vice president of Anaconda Copper, which he joined in 1945.

As president of Anaconda Aluminum, Caples will make his headquarters in New York. However, he will continue to manage the zinc contract negotiations for the Montana zinc plants of the Anaconda company.

With Anaconda Copper since 1910, Caples worked with the Montana reduction department as assistant superintendent, assistant general superintendent and general superintendent before becoming manager in 1941.

A graduate of the Missouri School of Mines, Caples has served as president of the American Zinc Institute.

RUSSEL B. CAPLES

He is also a director of the American Institute of Mining and Metallurgical Engineers.

•

George A. Carlson has been designated as manager of the new Oakland (Calif.) service branch of A. O. Smith Corp's Product Service Division.

Halbert B. Miller, manager of manufacturing for General Electric Co's industrial heating department at Schenectady, N. Y., has been made manager of manufacturing for GE's Major Appliance Division at Louisville, Ky. Miller, who joined the company in 1936, replaces **James H. Goss,** who recently was named manager of the home laundry equipment department.

Herbert J. Scholz, president and a director of Southern Services, Inc, has been named a director of Mississippi Power Co, an affiliate of the service company.

Edward A. Hagenbuch, superintendent of Pennsylvania Power & Light Co's Schuylkill Division lines and substations, has been named the utility's safety engineer to succeed the late Dan E. Albertson (EW, Feb. 16, p 31). Hagenbuch, who joined the utility in 1923, was appointed to the superintendent's post in 1950.

Vincent S. Madison, former power sales engineer for Detroit Edison Co, has been made head of the newly established Area Development Division of the utility's Sales Department. Madison, who joined Detroit Edison's Sales Department in 1936, has returned to the company after a two-year leave to serve as a consultant with the Power Branch of the Mutual Security Administration.

George D. Ellis, a vice president of Combustion Engineering-Superheater, Inc, since 1948, has been elected a director of the firm. He joined the company in 1915.

PS of Colorado Reveals 6 Key Personnel Changes

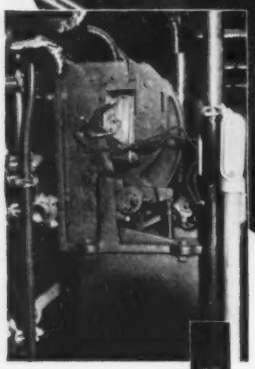
Public Service Co of Colorado has announced six major personnel changes in its electric operations.

L. R. Patterson has been advanced from superintendent of electric system planning to assistant to the vice president. R. F. Throne moves up from superintendent of steam generating plants to chief mechanical engineer. L. M. Robertson is promoted from assistant superintendent of hydro production and transmission to chief electrical engineer.

After serving as assistant superintendent of hydro production and transmission, H. A. Burt takes over as

DOW CORNING SILICONES

make coils last longer



$25 invested in Class H Saves $500; makes city water supply more certain

Half of Philadelphia's water supply is handled through the Torresdale Raw Water Pumping Station by six 60,000,000 gallon per day centrifugal pumps driven by 2300 volt, 500 hp motors. These motors are controlled by oil filled circuit breakers. Trouble was that the circuit breaker coils had an average life of only 3 months; cost the taxpayers $50 every time a new coil was installed.

So to save taxpayers' money and secure more continuous and reliable operation of pumping equipment, department engineers had these coils rewound with Class H insulation at an additional cost of $25 per coil. That was 30 months ago. Not a single coil has failed to date, and that's already 10 times the average life of previous coils. Represents a saving of $500 per coil; a net saving so far of $3000 less the original investment of $150.00 in Class H or $2850.

That's the kind of performance and the brand of economics that has persuaded a steadily increasing number of engineers and top management men to specify Class H insulation made with Dow Corning Silicones. In thousands of applications from subminiature electronic circuits, through traction motors, generators and transformers to industrial motors ranging from 1/8 to 1000 hp, Class H insulation has given 10 to 100 times the life of comparable equipment built with the next best class of insulating materials.

Increase efficiency; cut production and maintenance costs; specify silicone (Class H) insulation.

***NOTE:** New Dow Corning Silicone Resins are now available to give you unequalled freedom in design—still more power per pound—even longer life and greater dependability. Write for data on the new Dow Corning 994 Varnish for coating; Dow Corning 997 Varnish for impregnating; and Dow Corning 2105 Resin for bonding.*

mail this coupon *Today!*

DOW CORNING CORPORATION, Dept. AY-3, Midland, Michigan

Please send me:

- ☐ Performance data on Class H equipment
- ☐ List of Class H Rewind Shops
- ☐ Data on Dow Corning 44 Grease for bearings
- ☐ Data on Dow Corning 994 Varnish
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- ☐ Data on Dow Corning 2105 Resin

Name _____

Company _____

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City _____ Zone ____ State _____

DOW CORNING Midland — DOW CORNING SILICONES — **CORPORATION** Michigan

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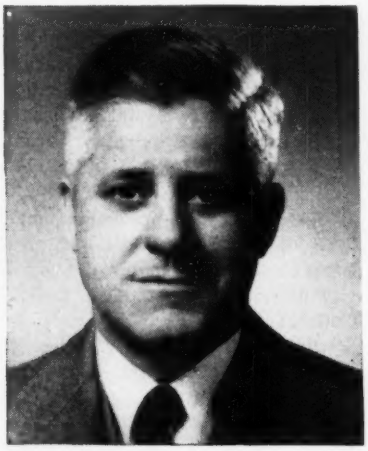
superintendent of system operations. A. A. Woodward advances from superintendent of steam production to superintendent of production. While retaining the title of superintendent of electric distribution, M. H. Powell has been assigned additional responsibilities.



HARRY E. BEANE

Bristol Co Names Beane Vice President of Sales

Harry E. Beane has been named vice president of sales of Bristol Co, Waterbury, Conn., manufacturers of automatic controlling and telemetering instruments and socket screw products. Beane, formerly general sales manager of the company, will continue to make his headquarters at Bristol's general offices in Waterbury.

The newly appointed official joined the Bristol sales engineering organization in 1920 and five years later was made district manager of the firm's Birmingham (Ala.) office. In 1930 he became district manager of the Pittsburgh office. He was made sales manager of the Instrument Division in 1943 and was promoted to general sales manager in 1947.

Beane has been a member of the American Institute of Electrical Engineers since 1920.

Heads B. C. Group

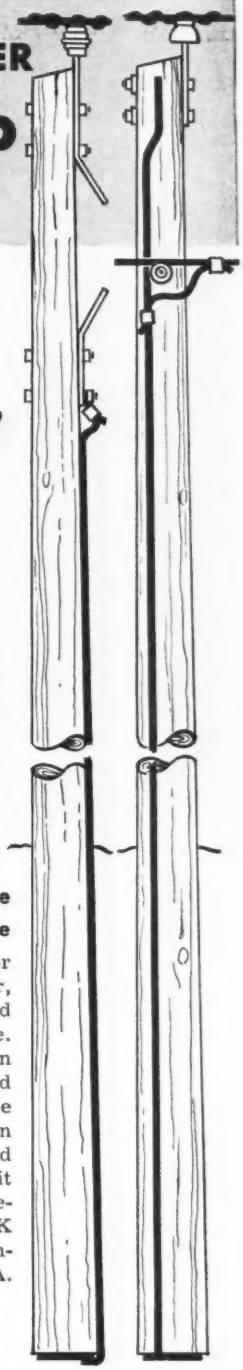
W. W. Foster, of the British Columbia Power Commission, is new president and chairman of the Electrical Service League of British Columbia, succeeding Howard N. Walters, manager of the British Columbia Electric Co's General Sales Division, who held

SAVE LABOR-SAVE COPPER

do a better job

WITH Blackhawk Industries

POLE PROTECTION GROUND ASSEMBLY



✔ lead wire permanently attached to butt plate

✔ available with any required length lead wire

The pre-assembled Pole Ground Unit, ready for immediate installation . . . saves time and labor, eliminates waste of copper wire cut in the field . . . assures a strong connection under the pole. A pre-determined measure of No. 6 soft drawn copper wire is coiled and permanently attached to the copper plate. B. I.'s positive butt type Pole Ground Assemblies are available and in regular stock for all standard pole lengths and plainly marked with the pole length for which it was made. Or, they can be supplied for any required pole length as specified. BLACKHAWK INDUSTRIES' Pole Protection Ground Assemblies fully meet the requirements of R.E.A. Specification M2-2.

Write for complete catalog or spec. sheet

SPECIFY B-I WHEN YOU BUY

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BLACKHAWK INDUSTRIES *Dubuque, Iowa*

Blackhawk Industries

Entrance Cable Fittings . Beam Clamps . Yard Lights Sill Plates . Locknuts and Bushings . Fluorescent Brackets . Wire Holders . Cable and Conduit Straps . Connectors . Box Supports . Conduit Entrance Caps . Grounding Assemblies . Grounding Clamps . Bar Hangers . Fish Tape . Conduit Hangers . Staples . Wood Screws . Machine Screws.

Simple EASY to APPLY!

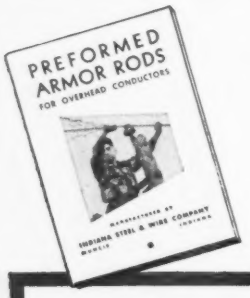
10-WAY PROTECTION

1. Reinforce conductors at supports.
2. Minimize wear and chafing.
3. Protect against flash-overs and arcing.
4. Provide increased holding power.
5. Absorb and dissipate vibration.
6. Eliminate tie and clamp damage.
7. Increase radiation area.
8. Reduce corona losses.
9. Prolong conductor life.
10. Cut overall maintenance expense.

Preformed ARMOR RODS

Tightly grip . . . without clamp or clip!

SAFEGUARD CONDUCTORS AT LOW COST!



PREVENT abrasion and chafing of conductors at the supports and you eliminate a major cause of conductor failure. By completely armoring the conductor against wear at these vulnerable points, **Preformed Armor Rods** prolong conductor life . . . help to minimize service interruption . . . keep down repair costs.

Accurately designed and preformed to prescribed length and pitch to perfectly fit the specific conductors or strand on which they are applied, these spiral rods provide a *simple, practical* and *economical* armor protection.

Preformed Armor Rods are quickly and easily applied by hand. Produced in Galvanized Steel, Aluminum Alloy, Copperweld and Bronze.

● *Write today* for your copy of this informative 8-page bulletin fully describing Preformed Armor Rods' purpose, features and application.

Ask your Graybar representative for details!

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

the position for three years. New vice president is H. H. Horsman of Horsman & Co, and J. R. Dooley is acting secretary manager.

Named Executive VP

L. W. Teegarden has been elected executive vice president of Radio Corporation of America. Prior to assuming his new post, Teegarden was vice president in charge of technical products of the RCA Victor Division. Active in electrical and electronics industries for many years, he became affiliated with RCA in 1930.

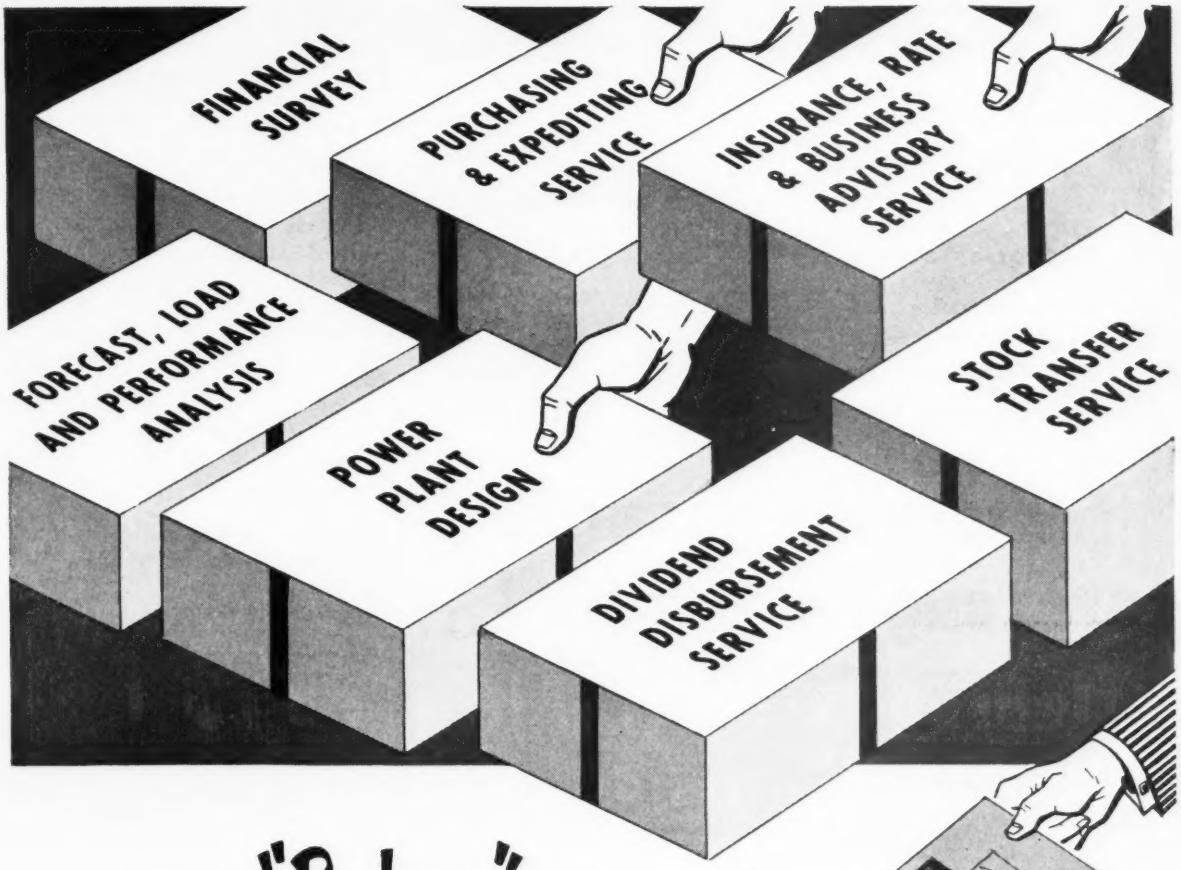
Dwight Douglass, production manager of Hartford (Conn.) Electric Light Co, has been appointed assistant vice president of that utility and the Connecticut Power Co, Hartford. Starting with Hartford Electric in 1920, Douglass became production manager in 1951.

Dr Sylvan Wallach, formerly associated with the Atomic Power Division of Westinghouse Electric Corp, Pittsburgh, has been named senior scientist on reactor design development for Walter Kidde Nuclear Laboratories, Long Island, N. Y.

Burton Zook has been appointed sales manager for the industrial ovens and heating equipment of Jensen Specialties, Inc, Detroit. Zook, who has 17 years' experience in industrial sales engineering, has served Jensen as sales engineer for the last seven years.

S. L. Thurman, who has been assistant Central Division manager for Kentucky Utilities Co for the last seven years, has been appointed manager of the company's Central Division. He replaces **C. B. Hanna,** who has been division manager since 1931. Hanna will be retired to limited service duties as a consultant with the general office at Lexington, Ky.

C. G. Wallis, formerly manager of the headquarters manufacturing department of Westinghouse Electric Corp's Headquarters Manufacturing Division, has been made assistant to the division's vice president in charge of manufacturing in a division reorganization. Other appointments include: **L. S. Houk,** as director of works engineering; **N. H. King** and **R. I. Wilson,** director and assistant di-



These "Package" Jobs are Pioneer's Specialty

Probably you have found that the recruiting of personnel and facilities for your "once-in-a-while" jobs can be disruptive and costly. That's because few companies are equipped to handle their own power plant design, dividend disbursement, rate studies and the like which occur periodically or irregularly.

But such operations are part of Pioneer's constant, complete service. Like public utility service itself, you use only what you need of our ready facilities and counsel, and you pay only for what you buy—a "packaged" service.

Your company uses several of the once-in-a-while functions listed here. Write for our booklet, let us know your need, let us prove that Pioneer can do the job to your entire satisfaction.

51 YEARS

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If you can use . . .

- Consulting Engineering and Power Plant Design Service . . .
- Financial Advisory Service . . .
- Stock Transfer and Dividend Disbursement Service . . .
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- Insurance, Rate, Accounting and Tax Advisory Service . . .
- Forecast, Load Study and Performance Analysis Service . . .

From Atomic Energy Plants to Rotogravure Presses . . .

From Power Plants to Perfume Producers . . .

. . . 42 Stories above Manhattan . . .

Deep Down in the Earth . . .

wherever hazards are tough or unusual . . .

CARDOX experience means dependable FIRE PROTECTION

When you buy fire protection, take a long, hard look into the experience of the people who plan and engineer it. It may mean your business survival—and the best way to judge is by what they've done!

CARDOX' experience in fire protection by low pressure carbon dioxide is on the record for all to see. For example, CARDOX Systems and Equipment* are protecting:

Vital equipment in atomic energy plants.
Much of the equipment in 14 of the nation's 25 largest utilities.
Practically all U. S. jet engine test cells.
The world's first continuous seamless pipe mill.
A radio station 42 stories above Manhattan.
Precious records in a deep underground vault.
The world's largest rotogravure press.
Even the ingredients of a perfume producer.

The list could be expanded indefinitely. This broad "know-how" of CARDOX—based upon *thousands* of successful Systems, *plus* years of research *is the priceless "extra" you don't pay for in every CARDOX System.* Why not write to see how we can help you?

**Covered by Patents, Issued and Pending.*

CARDOX

ORIGINATOR OF **LOW PRESSURE CO_2**

FIRE EXTINGUISHING SYSTEMS

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

Offices in Principal Cities

rector, respectively, of production and inventory control; **G. C. Moore,** director of plant industrial engineering; **V. D. Mack,** supervisor of manufacturing student training; and **Joseph Manuels,** director of quality control.

Arthur B. Oday, an executive engineer, with General Electric Co for more than 40 years, has retired. Regarded as a pioneer-leader in the application of fluorescent lighting to commercial, industrial, and residential fields, Oday served for two decades as executive engineer in the GE Lamp Division's application engineering department at Nela Park, Cleveland. He was national secretary of the Illuminating Engineering Society in 1928-1929.

Frank W. Womer, Jr, has been appointed assistant operating superintendent of the Southern Division of Pennsylvania Electric Co.

OBITUARY

Charles G. Curtis

Charles Gordon Curtis, 92, a pioneer inventor in the turbine engine field and retired president of the International Curtis Marine Turbine Co and the Curtis Gas Engine Co, died at Central Islip, Long Island, N. Y., March 10.

Curtis was known internationally as the inventor of the Curtis steam turbine, which was patented in 1896. Land rights to the turbine, used in electric power plant installations, were sold to General Electric Co. He also was credited with the invention of the first American gas turbine, patented in 1899. Curtis, at one time an associate of the late Thomas A. Edison, received in 1948 the first annual award of the Gas Turbine Power Division of the American Society of Mechanical Engineers for "pioneer work in the field of gas turbines."

He retired from International Curtis and Curtis Gas in 1951.

Harry L. Wickstrom, 68, former assistant superintendent of electric distribution for Public Service Co of Colorado, died at Denver Feb. 27. He joined the utility in 1905, retiring in 1950.

Leroy E. Yoder, 63, former chairman of the Indiana Public Service Commission, died Feb. 22 at Goshen, Ind.

SPECIFICATION SHEET

THESE ARE THE REASONS FOR SPECIFYING ORANGEBURG FIBRE CONDUIT:

- ★ Lasts indefinitely.
- ★ Impermeable wall.
- ★ Lays faster and at lower cost than any other type of conduit.
- ★ Low coefficient of friction.
- ★ Resists acids, alkalies, salt, grease, oil.
- ★ Light and easy to handle.
- ★ Easy to tool on the job.
- ★ Tough and resilient — it does not crack or break when properly handled.
- ★ Orangeburg is a leader in every city and state.

Write to Dept. EW-33 for complete catalog.
Orangeburg Manufacturing Co., Inc., Orangeburg, New York

ORANGEBURG® FIBRE CONDUIT

STANDARD with concrete
NOCRETE without concrete

NOCRETE INSTALLED WITHOUT CONCRETE ENCASEMENT

STANDARD INSTALLED WITH CONCRETE ENCASEMENT

GENERAL ELECTRIC SUPPLY COMPANY
A DIVISION OF GENERAL ELECTRIC DISTRIBUTING CORPORATION

DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT
BRANCHES AND STOCKS IN PRINCIPAL CITIES

GraybaR ELECTRIC COMPANY

Not just Land, Brick, Mortar, and Steel, but . . . A Symbol of

TODAY, at Louisville, Ky., General Electric is building Appliance Park—the world's largest appliance-manufacturing plant.

It is a demonstration of our belief that the major appliance business will continue to grow and grow in the years ahead. We're backing that belief with these great, new manufacturing facilities. Appliance Park will produce finer appliances, representing better values to the consumer than ever before.

You, too, face great opportunity for growth. First, in the vast expansion of consumer demand for today's low-saturation appliances such as automatic washers, dishwashers, food freezers, room air conditioners, and dryers. Second, in the replacement market for today's established appliances such as refrigerators.

We believe that the following 16-point program will convince you that General Electric is offering the soundest and most complete program for reaching both of these great markets.

1. **General Electric Offers An Outstanding Line**—*A Fine Line*—with a wide choice of models and prices—and the exclusive features your customers want.
2. **General Electric Offers "Consumer Preference"**—In independent national surveys, 55.7% of women said, "General Electric makes the best appliances."
3. **General Electric Offers Dependability**—General Electric Appliances have earned a nationwide reputation for year-in, year-out dependability unmatched by any other manufacturer.
4. **General Electric Offers Unusual Sales Opportunities**—Concentration on one fine line offers more efficient selling, with its consequent better turnover and fewer markdowns. Concentration on one *complete line of matched appliances* offers you the much-desired balanced annual sales curve.
5. **General Electric Offers Price Protection**—Protection on your reported inventory against lowering of list prices of General Electric Major Appliances.
6. **General Electric Offers A Powerful Advertising Program**—The Joan Davis and Fred Waring Shows on TV, the Bing Crosby Show on radio, leading national magazines and hundreds of newspapers are steadily pre-selling General Electric Appliances to your customers.
7. **General Electric Offers Comprehensive Co-op Advertising**—General Electric and its distributor share the costs in newspapers, outdoor posters, car cards, TV, radio and motion pictures.
8. **General Electric Offers A Complete Display Program**—for each major appliance.
9. **General Electric Offers A Complete Sales-Aid Program**—tested special promotions, sales literature, presenta-

Faith in the Future

tions, demonstration kits, consumer motion pictures, and many other aids for complete year-around programs.

10. **General Electric Offers A Realistic Sales-Improvement Program**—continuous sales education for sales personnel.

11. **General Electric Offers Dependable Product Service**—Product-service schools maintain high standards among General Electric servicemen.

12. **General Electric Offers A Complete Finance Service**—The General Electric Credit Corporation covers every finance operation for *you* and your *customers*.

13. **General Electric Offers Continuous Distributor Cooperation**—The General Electric plan is not simply to sell appliances to *you*—but to help you sell them to your *customers*.

14. **General Electric Offers Important Special Services**—The General Electric Home Bureau, leader in kitchen-laundry planning, and the Consumers Institute, conducting courses for salespeople in the proper use and care of appliances.

15. **General Electric Offers Prestige**—General Electric is the oldest and most respected name in the electrical industry.

16. **General Electric Offers A Stake In Its Blueprint Of Opportunity**—Appliance Park will manufacture better appliance *values* than ever before. You and your customers can share in these values.

Appliance Park is our symbol of faith in the future—but it is also a very realistic blueprint of opportunity for us and for *you*.

Clarence H. Linder

CLARENCE H. LINDER, *General Manager*

Major Appliance Division
Louisville 2, Kentucky

GENERAL ELECTRIC

Westinghouse's Check Spree

Westinghouse Electric Corp has come up with a unique idea of explaining finances to its employees.

A copy of the special issue of Westinghouse News, using a checkbook approach, was mailed recently to each employee at his home. In this "checkbook" issue (see picture above), Westinghouse shows how it spent monies in 1952.

Interesting feature of this issue is how quickly $1,463,371,812 disappears. Eleven checks were written. And after that check-writing spree, Westinghouse's theme song was "I've Got Plenty of Nothin'."

Here's how the checks were drawn:

Check No.	Issued To	Amount
1.	Suppliers of Materials and Services	$705,984,968
2.	Lenders of Expansion Money	6,788,352
3.	Tax Collectors	110,939,857
4.	Wear of Facilities	23,731,104
5.	Westinghouse Employees (Wages and Salaries)—see picture above	481,482,238
6.	Westinghouse Employees (Vacations with Pay)	17,469,000
7.	Westinghouse Employees (Holidays with Pay)	12,680,000
8.	Insurance Companies, Trustees Pension Fund	25,264,353
9.	Social Security, Unemployment Compensation	10,450,337
10.	Westinghouse Stockholders (Dividends)	33,221,115
11.	Stronger Westinghouse (Future Job Security)	35,360,488
	Total	**$1,463,371,812**

Westinghouse's sales for 1952 totaled $1,454,272,598 (EW, March 9, p 166) and along with income from other sources, amounted to $1,463,-371,812. The latter amount is what Westinghouse took in and is the amount recorded in the checkbook before the firm began writing the checks.

A personal copy of the 1952 Westinghouse financial report to employees can be obtained by addressing requests to: C. A. Ruch, Manager of Employee Information, Westinghouse Electric Corp, P. O. Box 2278, Pittsburgh 30, Pa.

GE Reports Increases in 1952 Income, Sales

General Electric Co's net earnings in 1952 increased by 9.8% over 1951 while sales rose to a record level of $2,623,887,509, representing an increase of 13.1% over the previous year. Sales for 1951 totaled $2,319,-347,956.

Pres Ralph J. Cordiner said, despite continued high tax rates, 1952 earnings of $151,719,905 were exceeded only by 1950's $173,424,000. Net earnings in 1951 were $138,116,527. The earnings were equivalent in 1952 and 1951 to $5.26 and $4.79, respectively, per share of common stock issued.

Sales increased in each succeeding quarter of 1952 and reached a total of $810 million in the final three months which was a new peak for quarterly sales volume, Cordiner said. He added that the company's backlog of orders is greater than at any time in the history of the company.

In commenting on the year's operations, Cordiner noted a "continued healthy growth" in the company's production of heavy electrical apparatus for the expanding electrical utility industry.

Start of Harvey Plant Is Scheduled for June

Construction start on Harvey Machine Co's planned aluminum reduction mill at The Dalles, Ore., is slated for June 30. To date, the company has not determined which of optional sites on either side of the Columbia River it will build on.

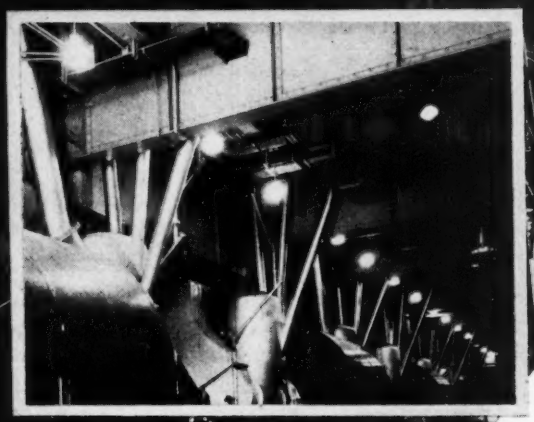
Harold J. Sullivan, public relations director, said plans were progressing

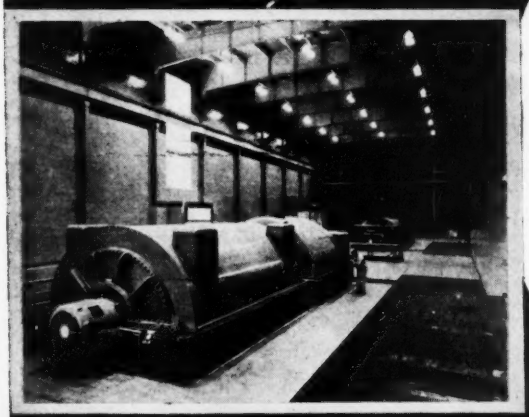
MANUFACTURERS' EARNINGS

Company	Period Months Ended		Net Income 1953	Net Income 1952	Earnings Per Common Share 1953	Earnings Per Common Share 1952
Reliance Electric & Engineering	3	Jan.	$385,297	$446,839	$ .84	$ .97(a)
			1952	1951	1952	1951
Arrow-Hart & Hegeman Electric	12	Dec.	$1,630,187	$2,389,016	$3.26	$4.78
Babcock & Wilcox	12	Dec.	8,689,241	8,004,782	6.16	5.67
Chicago Pneumatic Tool	12	Dec.	5,317,499	5,298,091	11.18(b)	12.28(b)
General Cable(c)	12	Dec.	5,283,230	5,506,949	2.38	2.48
General Electric	12	Dec.	151,719,905	138,116,527	5.26	4.79
Link-Belt(c)	12	Dec.	8,039,915	8,166,453	4.82(b)	4.93(b)
Minnesota Mining & Mfg(c)	12	Dec.	16,089,995	15,738,452	1.96	1.92
Sangamo Electric(c)	12	Dec.	2,014,000	1,828,000	2.88	2.61
Square D	12	Dec.	4,486,135	5,326,319	3.26	3.87

Notes—(a) Based on shares now outstanding; (b) On shares outstanding at close of respective periods; (c) These figures have been audited.

The Nation's Foremost GENERATING PLANTS are equipped with HOLOPHANE Lighting





Through more than two generations Holophane Engineering has concentrated on the design and development of specialized lighting equipment for generating stations... In the Pennsylvania Power and Light Company's new Sunbury plant (Ebasco Services Inc. were the consulting engineers and general contractors under the supervision of the Engineering and Construction Dept. of the P. P. & L. Co.) Holophane Lighting systems were extensively used . . . The Sunbury plant is exceptionally well illuminated, the minimum level is 25 footcandles throughout with exception of passageways, walkways and coal-conveying areas (minimum of 15 footcandles).

Upper Left: COAL PULVERIZERS using Holophane No. 685 Units. The upward component of light (10% of total) is advantageous in illuminating equipment near ceiling.

Lower Left: The TURBINE ROOM, in the Sunbury Plant has 55 footcandles from triplet Holophane high bay units (combining Mercury and Incandescent).

Background: 66KV SWITCH YARD lighted by Holophane Substation units. Note excellent vertical illumination and effective ground light.

Write for latest Holophane Engineering data on Generating Station Lighting; sent without charge

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Another new development using

B. F. Goodrich Chemical *raw materials*

Brushed-on plastic coating stops motor parts corrosion

Dolflex coating made by John C. Dolph Co., Monmouth Junction, N. J. B. F. Goodrich Chemical Co. supplies the Geon resin only.

MOTOR repairmen find this new plastic coating a better-than-ever help to protect electrical motor components against corrosion. Made from a Geon vinyl resin, it does a better job than varnish-filled putty or other coatings. And it can be applied by brushing, coating or spraying—using a minimum amount of equipment.

The manufacturer found in Geon every quality needed to assure a completely protective coating. After fusing, the coating is extremely tough. It will not burn or support combustion. It resists acids, alkalies, caustics, oil and moisture. It has good heat conductivity—will not trap heat—and will not soften in the range of 250° to 325° F.

What Geon does for this plastic coating may start you thinking of how Geon materials can help you develop or improve more saleable products. For Geon materials resist heat and cold, water, weather, abrasion and most chemicals. We'll help with technical information. Please write Dept. GJ-3, B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

GEON RESINS • GOOD-RITE PLASTICIZERS...the ideal team to make products easier, better and more saleable
GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

rapidly since Interior Secretary Douglas McKay had signed Bonneville Power Administration contracts for current needed in 1954 or 1955. The reduction mill is to produce 54,000 short tons of ingots and Harvey plans additional facilities at the site downstream from the federal government's new hydro-power dam project at The Dalles.

MANUFACTURING BRIEFS

Production of primary aluminum in the United States during January reached 179,790,195 lb compared with the December, 1952, output of 166,817,187 lb, the Aluminum Association has reported. January shipments represented an increase of nearly 26 million lb over the January, 1952, primary output of 153,867,619 lb.

Kaiser Aluminum & Chemical Corp has borrowed $12 million on 3¾% promissory notes due Feb. 23, 1954, from a 12-bank group. Kaiser has also sold the second and last $14.5 million bloc of 4½% mortgage bonds due 1976 to a group of institutional investors.

McGraw Electric Co will submit for approval on March 25 to stockholders a profit-sharing plan designed to extend benefits to all employees of the company and its subsidiaries. Allocations for the fund from profits may run as high as 15% of the amount by which net earnings before taxes exceed income necessary to provide the company, or its subsidiaries, a return of 7% after income taxes.

M. W. Kellogg Co's new plant for the production of Kel-F fluoro-chlorocarbon plastics will soon go on the line. The new plant is located at Kellogg's Jersey City, N. J., manufacturing and development center. When in full operation, the unit will add over 1 million lb annually to the supply of this strategic material.

SALES ASSIGNMENTS

COMPANY STAFFS

Minneapolis-Honeywell Regulator Co's Micro Division has appointed Dale S. McQuiston, Jr. as head of its newly established engineering service and sales office in Rochester, New York. The Rochester office, located at 721 Mount Read Blvd.,

THE WESTINGHOUSE REGISTER DESIGN

gives you higher sustained accuracy

For long-range sustained accuracy, the register in your meters must be friction-free and corrosion-proof. Only Westinghouse registers have *four important factors* which utility experience has proved are the best guard against corrosion and inaccuracy.

Co-ordinated materials—Gears, shafts, and frame are *brass.* There's no electrolytic action between dissimilar metals to cause corrosion.

Gold plating—The best protection against corrosive atmospheres is gold plating, so that's what Westinghouse applies to all gears and shafts.

Precision machining—Westinghouse gears are precision milled, not just stamped out. The gear teeth have a special involute shape—so that they mesh in a smooth *rolling* action, not a scraping, sliding movement.

Sturdy frame—The frame of this register is scientifically designed to protect all gears and keep moving parts in rigid alignment. The register will withstand a surprising amount of jar and shock without becoming damaged.

Get more facts—The superior register is one of many important features in Westinghouse meters. Write now for informative booklet B-4665—*What it Takes for Long-Time, Low-Cost Metering*—a 28-page booklet on the important factors in metering. Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J-40446

Everything you need in meters and instruments

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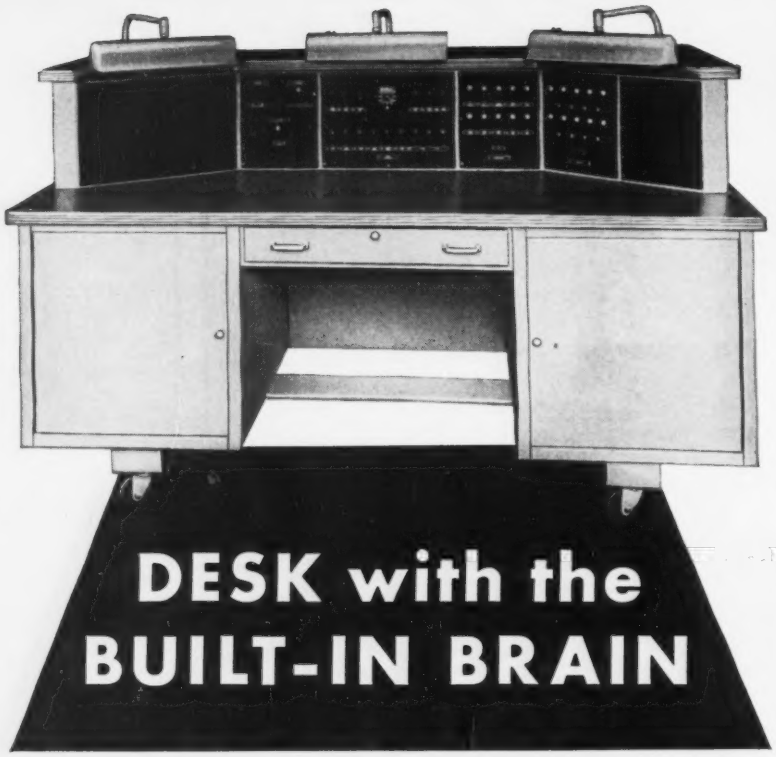

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This is an Operator's Control Desk with a built-in Supervisory Annunciator and Control Switches. While not itself restricted, it is presently being used in top secret government work because it gives dependable controls without the danger of waste or disaster caused by human failure. AUTH is a specialist in the manufacture of such equipment — your most dependable and most experienced source for all types of SUPERVISORY ANNUNCIATORS. Use AUTH annunciators to start or stop operations, control speed, cycles, changes; use them for black-out controls, air-raid howlers, gate-controls, process indicators. They can be had on desks, built into cubicles or consoles, as fan plates or arranged for wall mounting.

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will cover territory as far east as Binghamton and as far south as Jamestown.

Southern States Equipment Corp., Hampton, Ga., has appointed Frank Birchfield to its sales force. Birchfield, who will have offices in Alexander City, Ala., will cover the Georgia and Alabama territory.

Riley Stoker Corp., Worcester, Mass., has named Robert A. Banck as district manager of the New Orleans territory. Banck was formerly associated with Bigelow-Liptak Corp, Detroit, as chief engineer.

MEETINGS CALENDAR

North Central Electric Association
Accounting Conference, Dyckman Hotel, Minneapolis, March 23-24; Accident Prevention Committee, Dyckman Hotel, Minneapolis, April 21; Distribution-Equipment Engineering Meeting, Dyckman Hotel, Minneapolis, April 22; South Dakota All-Electrical Industry Meeting, Ward Hotel, Aberdeen, S. D., April 24-25.

A&M College of Texas
Conference for Protective Relay Engineers, Dept. of Electrical Engineering, College Station, Tex., March 23-25.

Illuminating Engineering Society
Canadian Regional Conference, Chateau Laurier, Ottawa, Ont., March 23-25; Southwestern Regional Meeting, Hotel Baker, Dallas, Tex., April 12-14; Pacific Northwest Regional Conference, Multnomah Hotel, Portland, Ore., April 23-24; East Central Regional Conference, Lord Baltimore Hotel, Baltimore, Md., May 14-15; Southern Regional Conference, Sedgefield Inn, Greensboro, N. C., May 18-19; Great Lakes Regional Conference, Syracuse Hotel, Syracuse, N. Y., May 25-26; National Technical Conference, Hotel Commodore, New York, Sept. 14-18.

Southeastern Electric Exchange
20th Annual Conference, Boca Raton Hotel, Boca Raton, Fla., March 23-25; Engineering-Operation Section, Edgewater Gulf Hotel, Edgewater Park, Miss., April 16-17; Industrial Power Sales Conference, Fort Sumter Hotel, Charleston, S. C., May 21-22.

Institute of Radio Engineers
National Convention-Exhibit, Waldorf-Astoria Hotel and Grand Central Palace, New York, March 23-26.

American Power Conference
Annual Meeting, Sherman Hotel, Chicago, March 25-27.

Oklahoma Utilities Association Convention
Tulsa Hotel, Tulsa, March 26-27.

Edison Electric Institute
19th Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 30-April 2; Accident Prevention Committee, Edgewater Beach Hotel, Chicago, May 4-5; Transmission-Distribution Committee, Edgewater Beach Hotel, Chicago, May 5-6; Electrical Equipment Committee, Sir Walter Hotel, Raleigh, N. C., May 11-12; Meter-Service Committee, Wentworth-by-the-Sea, Portsmouth, N. H., May 25-27; 21st Annual Convention, Atlantic City, N. J., June 1-4; Hydraulic Power Committee, Portland, Ore., June 15-16.

Southeastern Metermen's Association
28th Annual Short Course Conference, University of Florida, Gainesville, Fla., April 6-10.

Pacific Coast Electrical Association
Administrative Services Section Conference, Phoenix, Ariz., April 8-9; Annual Convention, Hoberg's, Lake County, Calif., May 13-15.

Northwest Electric Light & Power Association
Engineering-Operation Section, Multnomah Hotel, Portland, Ore., April 8-10; Business Development Section, Davenport Hotel, Spokane, Wash., May 4-6.

Northwest Public Power Association
Engineering-Operation Section, Osbourn Hotel, Eugene, Ore., April 16-17; An-

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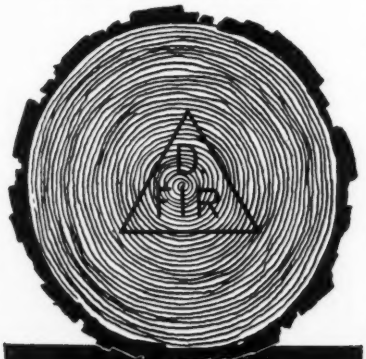
J. Neils Lumber Company, since 1895 a quality manufacturer of forest products, invites your inquiry on transmission and telephone poles. An illustrated folder on J. Neils treated poles, and information regarding their application to your own requirements, will be furnished on request.



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IT'S A COMPLETE PACKAGE, tailored for your make and model of truck. Derrick, winch and digger drive are all assembled to the body, ready for your truck chassis. Easily mounted in a few hours by your local mechanic.

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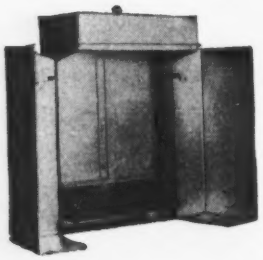
KEES Transformer Housing For 4 Transformers



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- Accommodates high insulation types of GE & Westinghouse transformers, ratio 20 to 1, 2300-volt primary.
- Mounting-bar which supports the two current transformers may be attached vertically or horizontally.
- 16-Gauge zinc-grip sheet steel, welded construction throughout. Doors hinged on both sides, with hold-backs and latch.
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F. D. KEES MFG. CO.
BEATRICE NEBRASKA

nual Convention, Ridpath Hotel, Spokane, Wash., May 6-8; Accounting Section, Monticello Hotel, Longview, Wash., Sept. 17-18.

Maryland Utilities Association
Annual Business Conference, Lord Baltimore Hotel, Baltimore, April 17; Fall Conference, Cavalier Hotel, Virginia Beach, Va., Sept. 18-19.

Electric-Gas Utility Accountants
National Conference, Sherman Hotel, Chicago, April 20-22.

***American Institute of Electrical Engineers**
Southern District Meeting, Hotel Seelbach, Louisville, Ky., April 22-24; Northeastern District Meeting, Sheraton Plaza Hotel, Boston, April 29-May 1; Summer General Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 15-19; Conference on Electric Heating sponsored by Committee on Electric Heating and Michigan Section, AIEE, Detroit-Leland Hotel, Detroit, May 26-27; Pacific General Meeting, Hotel Vancouver, Vancouver, B. C., Sept. 1-4; Middle-Eastern District Meeting, Daniel Boone Hotel, Charleston, W. Va., Sept. 29-Oct. 1; Fall General Meeting, Muehlebach Hotel, Kansas City, Mo., Nov. 2-6.

***Pennsylvania Electric Association**
Spring Meeting, Meter Committee, Hotel Alexander, Hagerstown, Md., April 23-24; Spring Meeting, Communications Committee, Hotel Roosevelt, Pittsburgh, April 30-May 1; Spring Meeting, Relay Committee, Valley Forge Hotel, Norristown, Pa., May 7-8; Industrial Sales Conference, Galen Hall, Wernersville, Pa., May 7-8; Electrical Equipment Committee, Benjamin Franklin Hotel, Philadelphia, May 12-13; Hydraulic Power Committee, Yorktowne Hotel, York, Pa., May 14-15; Transmission-Distribution Committee, Irem Temple Country Club, Dallas, Pa., May 14-15; Prime Movers Committee, Beachcombers Resort Hotel, Erie, Pa., May 18-19; Systems Operation Committee, Skytop Lodge, Skytop, Pa., May 21-22.

Rocky Mountain Electrical League
Annual Spring Conference, Shirley Savoy Hotel, Denver, Colo., April 26-28.

American Society of Mechanical Engineers
Spring Meeting, Deshler-Wallick Hotel, Columbus, Ohio, April 28-30; Semi-Annual Meeting, Statler Hotel, Los Angeles, June 28-July 2; Fall Meeting, Sheraton Hotel, Rochester, N. Y., Oct. 5-7; Annual Meeting, Statler Hotel, New York, Nov. 29-Dec. 4.

Electric Lines Club of New England
Spring Meeting, University Club, Boston, Mass., May 6.

Public Utilities Advertising Association
National Convention, Chase Hotel, St. Louis, May 7-8.

Electrical Manufacturers' Representatives Association of Michigan, Inc.
1953 Electrical Exhibition, State Fair Grounds, Exhibition Bldg., Detroit, May 19-22.

***Interstate Power Club**
Joint Meeting with Power Engineer's Association, Lawn Club, New Haven, Conn., May 22; Hotel Martinique, New York, Oct. 5; Hotel Martinique, New York, Dec. 7.

National Association of Purchasing Agents
Annual Meeting, Statler Hotel, Los Angeles, May 24-27.

National Association of Electrical Distributors
45th Annual Convention, Conrad Hilton Hotel, Chicago, May 24-29; Spring Meeting, Pacific Zone, Huntington Hotel, Pasadena, Calif., June 8-10.

California Municipal Utilities Association
Annual Conference, Clift Hotel, San Francisco, June 9-12.

International Association of Electrical Leagues
18th Conference, Fairmount Hotel, San Francisco, Aug. 5-8.

National Electrical Manufacturers Association
Annual Meeting, Haddon Hall, Atlantic City, N. J., Nov. 9-12.

*Addition this week.

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WHAT THEY'RE SAYING

At Industry's Meetings

Why Play by Ear?

DAVID F. AUSTIN, executive vice president, commercial, United States Steel Co, before the National Association of Cost Accountants at the Furniture Club at Chicago, Ill.

The era we are about to enter may well prove to be one of the most competitive periods in the history of American business. Today our national productive capacity is fast catching up with even that part of demand which we may properly consider abnormal. The new facilities which American industry is providing are, month by month, coming into full production. At the same time, we are fast approaching the point where the volume of materials going into construction of these new producing facilities will rapidly decline.

This competitive era will be no time to "play by ear." This expression has been used in Washington in recent years, and it simply means that when one is not sure of the best course to follow, when one does not have the facts on which to render a decision, in short when you don't know exactly what you are doing—you "play by ear."

Key: Long Term Planning

MARK W. CRESAP, Jr, vice president, Westinghouse Electric Corporation, before the Annual Fall Conference of the Society for Advancement of Management at New York City

To a greater degree than ever before, business success depends on long-term planning, so long as the plans are written in pencil rather than in ink. The difficulty of predicting the future must not be used as an excuse to ignore business planning. The key to successful planning lies in flexibility of the same type that military plans must possess, so that incorrect assumptions and unpredicted developments do not destroy the eventual execution of a planned operation.

Specifically, plans should be regularly revised every year, with each revision embracing the five subsequent years, and reflecting new circumstances and conditions, thus providing a rolling five-year plan based on up-to-date information and estimates.

KLEIN

Talk to any old-timer on the job and he'll tell you Klein equipment is his choice for comfort—for safety—for service. Look for the familiar Klein trade-mark on pliers, safety straps and belts, climbers, grips and wrenches. Klein has been serving the electrical industry "Since 1857."

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Utilities Push Adequate Wiring

CARL T. BEMICKER, vice president in charge of sales, Northern States Power Co, before the 9th Annual Adequate Wiring Conference at Chicago.

Why should a power company support the Adequate Wiring Program? Because there is a very definite relation between the number of appliances used in homes and the adequacy of the wiring system. Therefore a continuing increase in residential kilowatt hour consumption depends to a large extent on the wiring system on the customer's side of the meter. A Certified Adequate Wiring Program offers unusual opportunities in the field of good customer relations. It gives the electric utility a program through which it can promote greater safety in the home. Such a program is certainly in the public interest. An electric utility will also find that an Adequate Wiring Service Program will bring it much closer to architects, builders, home loan agencies, electrical contractors and electrical wholesalers. It is therefore a "natural" for good grade relations.

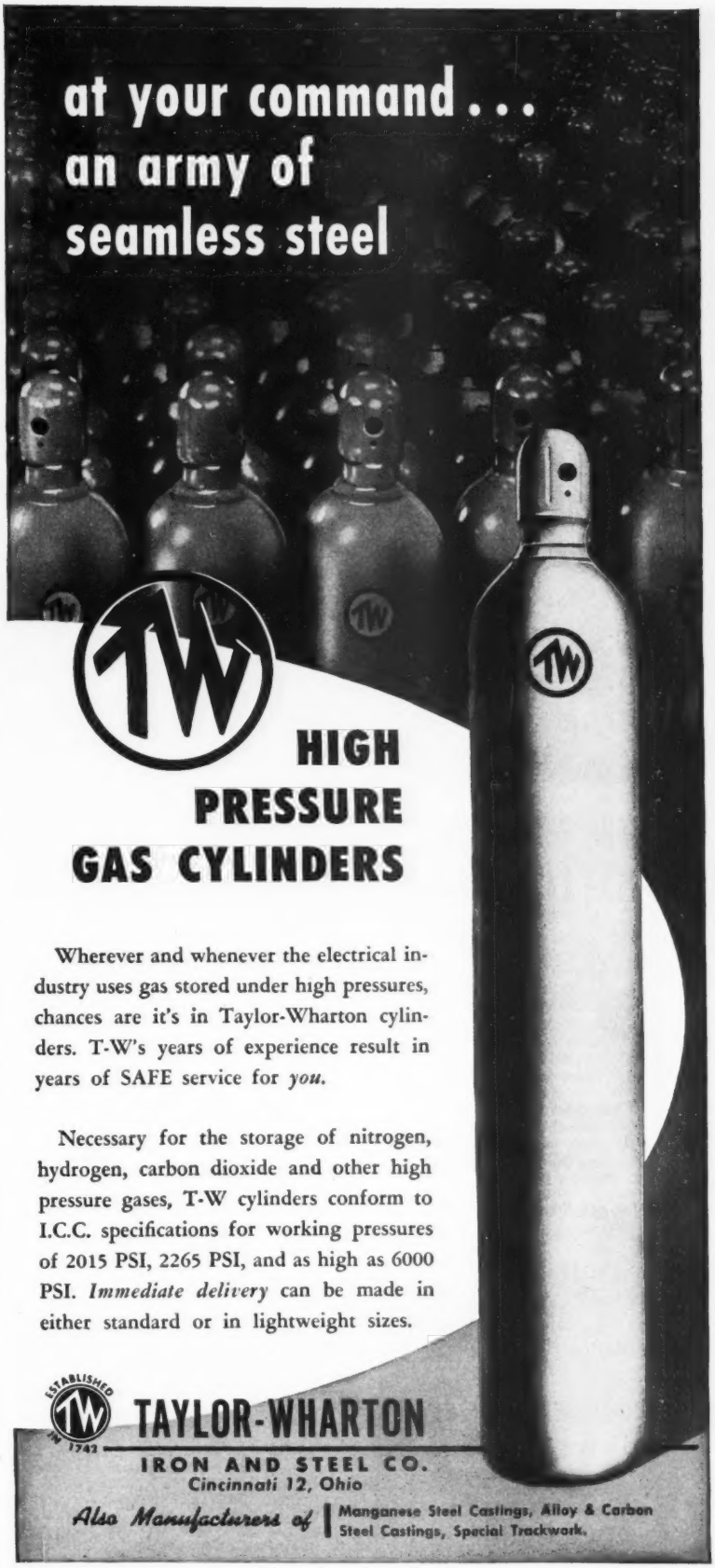
Most important of all, it is the responsibility of any business which manufacturers a product or sells a service to create and carry out sales promotion plans that will tend to insure the maximum use of the product or service it supplies. I sincerely believe there are great gains to be had by electric utilities in the Adequate Wiring Program. Whether they are realized depends upon how thoroughly we evaluate the potentials; how well we cooperate with the national effort and to what extent we are willing to back our convictions with money and manpower!

Management At the Local Level

C. A. CLIFT, vice president, Arkansas Power and Light Co, before the Annual Managers Meeting at Little Rock, Arkansas.

There are six basic principles under which local managers should supervise their groups. They should lead, not drive; be their best at all times; show employees that their work is worthwhile; give each employee a chance to extend himself; be helpful; and last but not least give recognition.

In my view, the difficulties between the public utilities and the public arise from the fact that the public utility managers know too much about their business and the public knows too little about it.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Necessary for the storage of nitrogen, hydrogen, carbon dioxide and other high pressure gases, T-W cylinders conform to I.C.C. specifications for working pressures of 2015 PSI, 2265 PSI, and as high as 6000 PSI. *Immediate delivery* can be made in either standard or in lightweight sizes.
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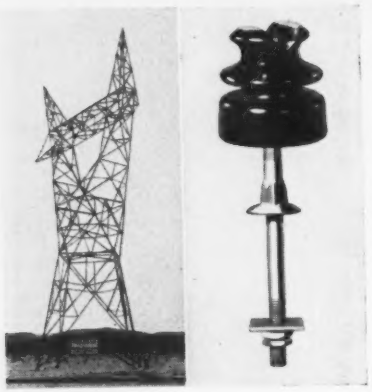
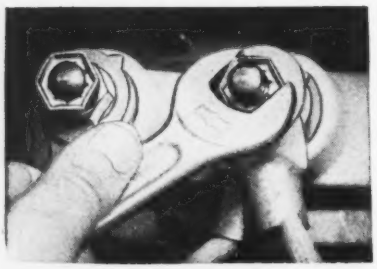


Connections stay tight!



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TECHNICAL LITERATURE

Cable—Phelps Dodge Copper Products, 40 Wall St, New York City, N. Y. has recently issued a color pamphlet describing Hydroflex Coaxial Cable, semi-flexible, aluminum sheathed, containing charts and photographs. This booklet may be obtained by writing to the company.

Flanged & Dished Heads—A new bulletin lists sizes of ASME and Standard Types of flanged and dished heads available for immediate shipment from stock. Heads are suitable for presure vessels, tanks, boilers and other applications such as ladle and melting furnace bottoms, ends for annealing pots, concrete mixer and brake drums, bases for lamps and stands, gear and grinder guards, special wheels—any application calling for an integral, continuous flange on a circular steel plate. Booklet will be mailed without charge on request to Joseph T. Ryerson & Son, Inc, Box 8000-A, Chicago 80, Illinois.

Tapes—Two dozen "Scotch" brand pressure-sensitive tapes that meet various government specifications are described in a new 16-pg manual anounced this month by Minnesota Mining and Manufacturing Co, St. Paul. The new "government" manual, available on request, contains 42 photographs and illustrations, and gives complete data on tapes for packaging, holding, mending, masking, sealing, mounting, protecting, insulating, and splicing jobs. In addition, the manual lists 11 tapes for the construction and maintenance of electrical and electronic equipment.

Breakers—"How Much Can a Breaker Take"? is the title of an 8 pg reprint from Allis-Chalmers Electrical Review by P. L. Taylor, general engineer of the company's Boston Works, which has been made available for general release. The article describes results of recent field tests conducted on a standard 69-kv, 1500-mva oil circuit breaker at the Siegfried substation of the Pennsylvania Power and Light Co. Copies of the reprint, 71R7855, are available upon request from Allis-Chalmers Manufacturing Co, 932 S. 70th St, Milwaukee, Wis.

Plastics—Latest developments in packaging protection, economy and sales appeal for a wide variety of products are presented in the "1953 Guide to Improved Packaging with Bakelite and Vinylite Plastics and Resins." Photographs illustrate packaging applications of vinylite, bakelite polyethylene, bakelite styrene and bakelite phenolic plastics and resins in the new, expanded 12-page edition. The properties, advantages, packaging applications and fabricating methods for the various forms of Bakelite and Vinylite plastics and resins are clearly set forth under six headings: Coatings, Molded and Blown Plastics, Sheet Materials, Film and Sheeting, Packing Materials, and Adhesives. Copies may be obtained by writing to Bakelite Company, a Division of Union Carbide and Carbon Corporation, 300 Madison Avenue, New York 17, N. Y.

Compressed Air—"Compressed Air Power in Industrial Production," a 36 pg pamphlet prepared by the Committee on Engineering Education of the Compressed Air and Gas Institute, 1410 Terminal Tower, Cleveland, Ohio, has just been released. This pamphlet, which contains 63 illustrations including photographs and line drawings, is the third in a series of engineering studies in the Institute's educational program for which it received the ATAE Award of Merit in 1952. The first two pamphlets were: "Compressed Air Power," a general treatise of compressed air equipment; and "Compressed Air Power in Construction," a comprehensive study of air-operated tools and equipment used in the construction industry. Copies are available at 25 cents per copy.

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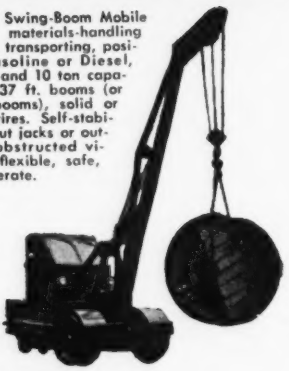

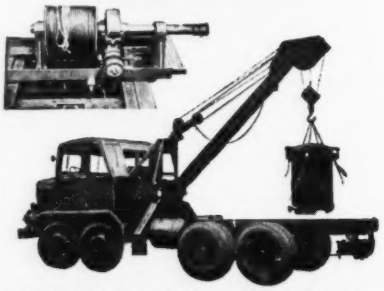

WINCHES: Capstans; Single and Double Drum, Jaw Clutch, Keyed and Friction Clutch Winches. 2,000 to 50,000 lb. Capacities.

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CATALOGS • BULLETINS

● **TRUCKS AND CRANES:** Catalog 54, a new 8 pg booklet in color released by The Baker-Raulang Company 1230 W 80 St Cleveland 2 Ohio, describes and illustrates that manufacturer's line of industrial trucks and cranes. The catalog shows at a glance the complete specifications on each product. Specification charts and photos are used to fully describe each model. Also illustrated are the important construction and design features of trucks, and the latest fork truck attachments available for Baker equipment. The catalog covers fork truck models from 1,000 to 10,000 pound capacities; high- and low-lift platform trucks in 6,000 and 10,000 pound capacities; crane trucks in 6,000 and 10,000 pound capacities; and the 2,000 pound capacity utility truck. Copies of the new catalog are available immediately on request.

● **HAND TOOLS:** A 30 pg booklet on "How to Use Hand Tools" has been recently released by the Crescent Tool Co, Jamestown, N. Y. Helpful to both amateur and professional mechanics it provides useful how-to-do-it ideas as well as basic information on proper selection care and maintenance. Write the company for information.

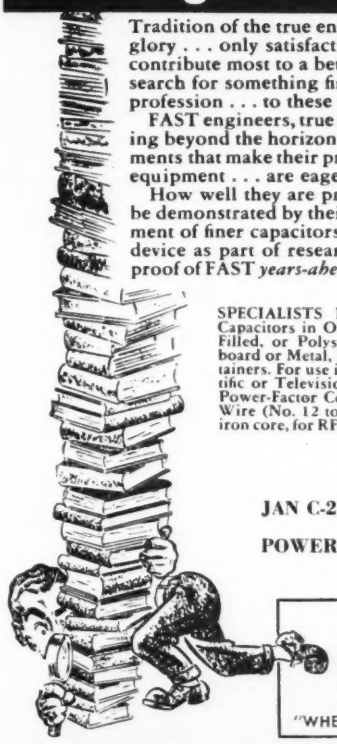
● **REFERENCE BULLETIN:** A 4-pg quick-reference bulletin, describing and illustrating their principal products, has just been issued by the Reliance Electric & Engineering Company, 1088 Ivanhoe Rd, Cleveland 10 Ohio, and is now available for general distribution to production managers, maintenance superintendents, machinery designers, electrical engineers, plant electricians, purchasing agents, and others interested in motors and related in-plant power-transmission equipment. The booklet, identified as Bulletin A-2703, gives capsule digests of precision Built A-c. motors from ¾ to 300-hp.; heavy-duty Type "T" D-c. motors from ¾ to 1000-hp.; the all-electric adjustable-speed "V*S) drive for A-c. circuits, from ¾ to 300-hp.; electronic controls and regulators for this motor-drive system; and motor-generator sets, generators, and rotating-type regulators.

● **ELECTRICAL INSULATING:** Descriptions, specifications, applications and other helpful information about woven tapes, cords and braided sleeving are included in a new bulletin just released. Copies are available from the Insulation Manufacturers Corp, 565 West Washington Blvd, Chicago, Ill.

● **MICROWAVES:** Economic aspects of multi-channel operation of telephone and telegraph circuits over microwave radio links are emphasized in a new bulletin 72A-P16, Microwave In The Telephone Toll Plant. Among the subjects discussed in this publication are the investment required for microwave equipment, the revenue possibilities which microwave provides, and the way in which the use of microwave affects such problems as future system growth, reliability of service, and installation and maintenance procedures. Copies of this new bulletin are available from Lenkurt Electric Company, Country Road, San Carlos, California.

● **BUILDING EQUIPMENT:** A revised catalog of equipment for buildings and institutions, known as Bulletin WP-1099-B27M, has just come off the press. The publication covers condensed information on sizes, dimensions, capacities, ratings, and features, of air conditioning and refrigeration products, with auxiliaries, oil, gas and dual fuel engines, deaerators and deaerating heaters, water conditionings, steam turbines and turbine generators,

Getting to the bottom of things



Tradition of the true engineer and scientist . . . no thought of personal glory . . . only satisfaction in the development of those things which contribute most to a better civilization . . . tireless in his never-ending search for something finer . . . such is the heritage of the engineering profession . . . to these we owe much.

FAST engineers, true to their profession . . . forward looking; searching beyond the horizon and planning ahead; ever seeking those refinements that make their product better to fit the needs of TOMORROW'S equipment . . . are eager to help you plan for the new day just ahead.

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*See HERMAN E. SEEMANN, PHYSICIST, KODAK RESEARCH LABORATORIES, "Miscellaneous Applications of Radiography and Fluoroscopy." Symposium on Radiography and X-Ray Diffraction Methods, American Society for Testing Materials, Philadelphia, Pa. (1937).

AVAILABLE LITERATURE
JAN C-25 APPROVED CAPACITORS:
Refer to Jan C-25, "Specifications."
POWER-FACTOR CORRECTION CAPACITORS:
Sections I, II, III, IV, Catalog 27.

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- The long life normal to relay equipment!
- Occupies the space of only two telephone relays!
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It's simple! It saves space! It saves money! . . . Actuated by electrical impulses, the *Kellogg Magnetic Impulse Counter* performs the counting and marking function of a chain of 10 to 20 relays or of a two-magnet ten-point stepping switch, in less space and with top reliability! It has a wide application in many fields—from industrial control to any system where trains of impulses, such as generated by a telephone dial are to be counted.

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liquid meters, centrifugal pumps; regenerative turbine pumps, vertical turbine pumps, and multi-v-drives. A copy of the revised bulletin may be obtained by directing requests to the Advertising and Sales Promotion Department, Worthington Corporation, Harrison, N. J.

● **CRYSTALS:** A complete new catalog of crystals has just been issued by the James Knights Company of Sandwich, Illinois, manufacturers of stablized quartz crystals. The new catalog lists forty-five different crystals for use in communications equipment, laboratory instruments, medical and industrial equipment, etc. Crystal applications range from two-way radio communication for airlines to unusual examples like this whaling application: a crystal controlled transmitter affixed to harpoons for directing vessels to the spent whale. Development engineers and others will find the new catalog of special interest. Copies may be obtained from the company.

● **RADIAL-FLOW SURFACE CONDENSERS:** A new 32-pg booklet titled "Radial-Flow Surface Condensers" is now available. Opening with an explanation of what the radial-flow design is, the booklet lists a number of its features. Color diagrams illustrate heat transfer, surface activity, and deaeration of condensate. Shop photographs show the type of shell construction, the way in which tube supports and tube plates are installed, tube rolling and lacking, provision for differential expansion, and shell connections. For a copy of this booklet, B-4350, contact your local representative or write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pa.

● **LIQUID FILTERS:** Bulletin D-IL, a new 12-pg illustrated bulletin describing liquid filters is available from the Dollinger Corporation, 11 Centre Park, Rochester 3, N. Y. The bulletin contains specifications, engineering and performance data, photos and descriptions of recommended types of filter media, check list of liquids that can be filtered.

● **WOOD PROTECTION:** A new booklet describing how creosote protects wood today has recently been released. It gives technical data on preservative value of creosote compounds and creosote fractions. It has been published by Koppers Company, Inc, Pittsburgh 19, Pa.

● **ELECTRONIC INSTRUMENTATION:** 32-pg booklet briefly describes electronic instruments providing direct-reading digital presentation of information, and their principal industrial applications. Covers high-speed counting, counting plus control, precise interval timing, measurement of rpm, pressure, temperature, flow, viscosity, velocity, frequency, distance, etc. Available without charge from Berkeley Scientific division of Beckman Instruments, Inc, 2200 Wright Avenue, Richmond, Calif.

● **LIGHTING FIXTURES:** Fluorescent lighting fixtures, troffer type for recessed mounting in accoustical ceilings are illustrated and described in Folio No T-50. Units have easy snap-in housing straps, supporting the housing by spring tension with no fastenings to the ceiling. The housing is of one piece construction, designed to receive end caps or couplings. Complete specifications, candlepower distribution curves, construction sketches and coefficients of utilization are included for each of the fixtures in the folio, which totals 12 pgs.

● **RELAYS:** A complete line of telephone-type relays, including hermetically sealed (in metal and glass containers) sub-miniature, plug-in types, etc, is described in a new, color-illustrated brochure released by Automatic Electric Co, 1033 W. Van Buren St, Chicago 7, Ill. Write for Circular 1702-A.

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UTILITIES
Long Life at Reduced Cost

with
NICKEL CADMIUM BATTERIES

The unique physical and electrical characteristics of NICAD batteries provide reliable, low-maintenance power for switchgear operation, supervisory control and emergency lighting on the typical sub-station installation above.

Compact NICAD cells consistently deliver high currents required for switch operation with minimum voltage drop, at either regular or intermittent intervals and are unaffected by long periods of idleness.

SAVE MORE MAN HOURS FOR A LONGER TIME
with
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Exceptionally Long Life
Negligible Water Consumption
Eliminates Gravity Records
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Write for Bulletin No. 136

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BOOK REVIEWS

Engineering Profession

Engineers and Ivory Towers. **By Hardy Cross. Published by McGraw-Hill Book Co, New York 36. 141 pages. Price $3.00.**

No matter where you went to learn engineering read this and let it disillusion you on the vaunted perfection of the curriculum and faculty to which you were exposed. Every sentence in this philosophy is an epigram that conspires to set a keen test for the engineer, the engineering professor and the engineering profession. Many schools and a large fraction of their product fall short of the homespun pattern framed in the writing of Hardy Cross. Some of the defects he attributes to "formularitis, translatitis and experimentalitis." Electrical engineers will have to read themselves and their cult into the book because the author (Strathcona Professor of Civil Engineering at Yale) draws all his episodes quite understandably from the civil engineering sector. That, however, does not detract from the universality of his message.

Atoms

The Atom Story. **By J. C. Feinberg. Published by Philosophical Library, New York 16. 243 pages, illustrated. Price $4.75.**

Conquest of the atom began with the efforts by the ancients to establish the degree of divisibility of matter. The "Story" goes back to Anaxagoras, Democritus, Aristotle and then moves on to Bacon, Boyle, Priestly and Cavendish. Next came Lavoisier, Dalton, Gay-Lussac and Avogadro who established the molecule. Berzelius was followed by Mendlegeff's periodic table, both by Becquerel and the Curies. Atomic smashing by Crookes and Thomson led into atom assembling by Rutherford and Geiger. Wilson contributed the cloud chamber, Chadwick the neutron, Bohr the atom frame and Einstein the prophecy that matter was convertible into energy and vice versa. Atomic energy was the inevitable result of this 20th Century determination to bore into the innards of matter.

Electrical Manufacturing

The Electrical Manufacturers 1875-1900. **By Harold C. Passer. Published by Harvard University Press, Cambridge, Mass. 412 pages, illustrated. Price $6.**

This volume, one of a series of studies on entrepreneurial development of industry, thoroughly analyses the people and the economic conditions which influenced the origins and development of electrical manufacturing. Starting with arc lighting, the author traces the competition between people and companies, the resultant technological developments, the marketing problems involved. With the introduction of incandescent lighting, new patterns developed and brought Edison and Westinghouse directly into the great ac-dc controversy, which is discussed at length.

The introduction of the motor and the consequent development of the electric railway industry, which really fixed the pattern for the electrical manufacturing industry which was to evolve, is the third phase of growth studied.

Exhaustive in research and detailed in analysis, the book is valid testimony to the need for enterprise and entrepreneurship in the development of an industry. Yet the author appears to have missed the real significance of the ac-dc controversy. And there is a sad lack of emphasis on the profound influence of measuring apparatus in the economic fulfillment of the industry's growth potential.

How not to "SHORT-CHANGE" Your Customers

. . . WHEN YOU SELL THEM TAPE!

While minimum length can be depended on to be accurate in every roll of tape, it's the *weight* of the roll that you must watch. It is important for you to know: Does the No. 4 Roll actually weigh 4 ounces, as it should; or the No. 8 Roll 8 ounces?

For weight reveals whether tape is full strength in substance, or whether its protective and adhesive properties have been weakened due to skimpy materials. Underweight tape results in customer dissatisfaction.

You can always weigh every roll you buy, of course, but why bother, when HAARTZ-MASON publicly makes you a DUAL GUARANTEE — a guarantee covering both weight and length, and prints this information boldly on every roll and container.

HAARTZ-MASON is currently promoting the importance of weight to your tape customers and urging them to look for weight information on every roll they buy. So avoid possible loss of tape sales by putting in a stock of the DUAL GUARANTEED HAARTZ-MASON brands today.

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Note: Weight and length information are printed boldly on every roll and container.

Cut Your Installation Costs!

Drive Rods TWICE AS FAST with 1/2 the manpower

using a KEARNEY GROUND ROD DRIVER

No more tedious, time-consuming sledge driving. Actual field tests have shown that *one man* using a KEARNEY GROUND ROD DRIVER can drive two 8-foot rods in less time than it takes two men to drive one rod by old-fashioned methods.

Operator simply inserts any length of rod through the hollow handle. Rod is gripped near the ground by a heavy chuck. Downward blows of the handle against the chuck quickly drive the rod, the weight doing most of the work. Old rod may be easily pulled out of the ground by reversing this procedure.

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FACTORIES need MORE ELECTRICAL OUTLETS!

PLUGMOLD 2000 with Snapicoil

Is the FASTER, EASIER, CHEAPER way to provide multiple convenience outlets!

PLUGMOLD makes work benches more efficient!

This easy-to-install multi-outlet system gives you outlets right at the spot where they're needed — Duplex or NEMA grounded outlets every 30 inches in a continuous run. Closer spacings available if needed; also available in 3-foot and 6-foot factory-wired sections.

PLUGMOLD 2000 eliminates the hazards of a tangle of extension cords — dangerous to workers and to the work! With a PLUGMOLD outlet right at the point of use, you can use shorter cords for electrical tools.

Write today for the free Plugmold 2000 book!

WIREMOLD

Makers of
PLUGMOLD – multi-outlet systems
WIREMOLD – electrical raceways
PANCAKE – overfloor raceways

THE WIREMOLD CO.
Hartford 10, Connecticut

FINANCIAL

(*Continued from page* 128)

cost by leaving flood lights on during the month of August," this customer reported to the league.

L. N. Roberson, chairman of the league's subcommittee on City Light and a dealer in soil-heating coils such as are used in greenhouses, said there are many similar cases, notably among families which have greenhouses. Commercial users, as well as large domestic users, are paying more money, to make up for the savings enjoyed by domestic customers in the $5 to $14 monthly bill class, Roberson asserts.

New Franchise for Utility Delayed by County Board

On advice of the county counsel, the Los Angeles County Board of Supervisors has held up passage of an ordinance granting a new 50-year franchise to Southern California Edison Co for use of streets in unincorporated county territory. Edison requested the new franchise to replace one granted in 1933, on the grounds that the market position of its bonds would be strengthened by the later expiration date.

Gerald G. Kelly, assistant county counsel, advised the supervisors that passage of the ordinance with phraseology requested by Edison would jeopardize the county's interests in a $1-million suit pending against Edison, Southern Counties Gas Co, and Southern California Gas Co.

At stake in the suit is the method of defining gross receipts of the utilities that arise from possession of franchise. The county gets a 2% share of such revenue.

The county contends that all distribution facilities located within unincorporated territory — including office space and installations on consumers' property—should be figured. The utilities contend that only equipment actually located on county roads can be counted in calculating the county's share.

The county is suing for the difference in fees between the utilities' calculations and its own, from 1936 to the present. A Superior Court decision last May held for the utilities. The county has appealed and the case is now pending in the District Court of Appeals.

FASTER TO INSTALL

PLUGMOLD 2000 with SNAPICOIL by WIREMOLD

TIME-SAVING FEATURES

COVER
receptacles snap into cover . . . cover snaps into base

SNAPICOIL
pre-wired in 50-foot Snapicoils

BASE
mounts in a continuous run

Installing multiple convenience outlets is a real "snap" with Plugmold 2000 and Snapicoil! You *snap* the receptacles into the cover and *snap* the cover into the base—a few simple snap-over fittings complete the job! Takes minutes instead of hours.

Write today for new, free Plugmold 2000 book!

PLUGMOLD 2000

WIREMOLD'S *New* multi-outlet system

THE WIREMOLD COMPANY
Hartford 10, Connecticut

Washington Bill Gets Public and Private Support

Public and private power proponents finally have found one issue before the Washington state legislature upon which they can agree—the strengthened state power commission proposed by Gov Arthur B. Langlie.

After a public hearing which failed to find any real opposition to the proposal, the bill was approved by the House. Early Senate approval seems likely. The bill would create a 5-man commission with authority to build or buy facilities for generating and transmitting energy, and would allow any city or PUD to enter into agreements to build and operate power facilities.

Speakers at the public hearing agreed the measure would provide the means for public and private power forces to join in building generating facilities needed because of the prospect for reduced federal aid, in the face of increased demand for power. Chauncey Price, president of the Washington PUD Commissioners' Association, declared "this could be one of the most far-reaching pieces of legislation in the history of the state."

The commission would be empowered to enter into contracts with the federal government, Canada or any PUD or city in the state.

REGULATION

Martinsville, Va., municipal plant has received City Council approval to increase rates about 10% for domestic, 12% for commercial, and 12½% for industrial consumers.

Uniform System of Accounts for Electric Utilities recommended by the National Association of Railroad and Utilities Commissioners for adoption by state public utilities commissions is now available from The State Law Reporting Co, 30 Vesey St., New York City, at $4 a copy. List of Retirement Units for Electric Utilities, which supplements the Uniform System of Accounts, is also available at $2 a copy.

Concord, N. H., Electric Co is seeking a rate increase of 20¢ per month for majority of residence customers . . . **Lynn Gas & Electric Co** has received Massachusetts Department of Public Utilities approval to increase rates about $685,000 net a year.

NDA

atomic power for civilian use?

NDA, the senior independent nuclear engineering firm in the United States, has placed at the disposal of leading companies its experienced staff of nuclear engineers, physicists and mathematicians. We at NDA have produced tangible and practical results for our clients by employing advanced technical research and design working towards the application of nuclear reactors for civilian use. Major clients include the U. S. Atomic Energy Commission, The Babcock & Wilcox Company, Bell Telephone Laboratories, Inc., Carbide & Carbon Chemicals Company, The Detroit Edison Company, The Dow Chemical Company, The International Nickel Company and Pratt & Whitney Aircraft.

On request: "Collected Papers on Atomic Power for Civilian Use." Write, on your company letterhead, to NDA, 80 Grand Street, White Plains, New York.

Nuclear Development Associates, Inc.

NEW!

DERRICK SLASHES POLE SETTING COSTS

New Hall Hydraulic Derrick*

The new Hall Hydraulic Derrick (shown mounted on a Hall Body) has many advantages — they all add up to lower pole-setting costs, with a bonus of greater safety.

This derrick can be erected in less than one minute, stowed in the same time by only two men. "That feature alone can save over $5.00 a pole," says one Western utility executive.

Fits any conventional line truck. "Floating boom" permits 19' model shown to vary from 23' above ground to 12'; will set 55' poles. 17' model will set 45' poles. Working capacity 4500 lbs. in top position, 1200 lbs. in low position.

* *Patents pending.* *Demonstrations arranged on your property.*

HALL HYDRAULIC DERRICK

AMERICAN TRUCK EQUIPMENT CO. Swan Island, Portland, Oregon

FRED C. HALL CO. 17 Cedar St., San Carlos, California

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Open

We build them . . . with modern materials and engineering techniques . . . plus up-to-date design . . . based on years of experience.

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DISTRIBUTION TRANSFORMERS (DRY TYPE)

Here is a typical air-cooled 500 KVA class B type. 80°C Rise. 3 phase 4160 Delta Primary ± 2½% full capacity taps. 240x480 Delta Secondary. Available from 30 to 2500 KVA with voltages from 2400 to 15 KV.

DRY TYPE
Indoor or Outdoor
3 KVA to 15 KVA
Air-Cooled

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MEETS STANDARDS OF AIEE-NEMA

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*If you think this is just an advertising adjective we invite you to contact us . . . we will tell you who buys Magnatran —the better transformers . . . and if you want, show you how we build them.

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TRANSFORMERS AND ELECTRICAL EQUIPMENT

WALTER GARLICK, JR., PRESIDENT

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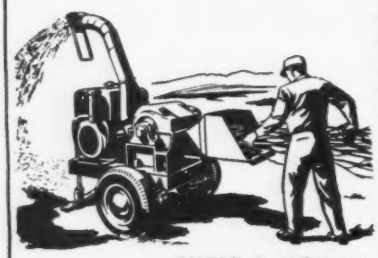
SAVE up to 85% brush handling costs.



This new M&M brush grinder rapidly converts 7 truckloads of brush into one truck load of chips.

Save on labor costs . . . truck operating costs. One man feeds brush or branches up to 6" in diameter into the Brush Grinder where they are chewed into small uniform wood chips and automatically blown into a truck or spread on the ground. The new M & M Brush Grinder is a portable unit with its own power plant. It hitches to jeep, car or truck for transportation right to the job. Safe easy operation with all moving parts fully enclosed. Nearly 100 years of experience in building fine grinding equipment is your assurance of long dependable service from an M & M brush grinder. WRITE FOR ILLUSTRATED FOLDER TODAY.

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Here is an Opportunity for a Transmission Engineer

who desires outside contact work. Preference given to a graduate E.E. but equivalent field experience will be considered. Man desired should be between 30 and 44 years old and have had practical Distribution and High-Voltage Transmission experience, including design, construction and installation. Responsibilities will include field consultation, as well as sales engineering contact with Utilities, REA's, Government Agencies, as a representative of a leading national manufacturer.

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KEEP

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ACKNOWLEDGMENT

Data and other information in the commercial cooking survey report on pages 113 to 120 was drawn from the activities of the 119 utilities listed below. To all who cooperated in supplying material, Electrical World offers its thanks.

Alabama Power Co
Appalachian Electric Power Co
Atlantic City Electric Co

Bangor Hydro-Electric Co
Black Hills Power & Light Co
Blackstone Valley Gas & Electric Co
Board of Public Works, South Haven, Mich.
Brockton Edison Co

California Electric Power Co
California Oregon Power Co
Carolina Power & Light Co
Central Hudson Gas & Electric Corp
Central Illinois Electric & Gas Co
Central Illinois Light Co
Central Illinois Public Service Co
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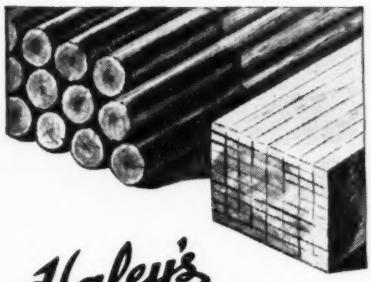

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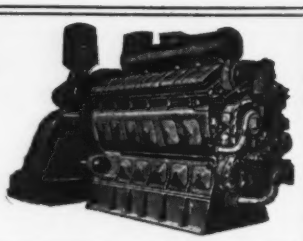

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1136	Fairbanks Morse	38D	1600	720	250	Fairbanks Morse	37–E	375	360
1100	General Motors	16–278A	1600	720	200	General Motors	8–268A	350	900
750	General Motors	12–567	1080	720	150	Worthington	CC–4	225	450
500	Baldwin	VO–8	750	514	150	Buckeye	80	240	600
500	General Motors	8–278A	750	720	100	Worthington	BB–5	150	600
500	General Motors	8–567	720	720	100	General Motors	3–268A	150	1200
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3—	1500	G.E.	514	250	6600/13200
1—	1500	G.E.	600	600	2300/4150
1—	1000	G.E.	900	260	4100/6900
2—	1000	Whse.	900	600	2300/4158
1—	500	Whse.	900	250	6609/13200
1—	500	Whse.	1200	125/250	2330
1—	500	Whse.	900	250	440
1—	500	G.E.	720	125	2300
1—	400	G.E.	720	250	440/2300
1—	350	G.E.	900	125	4150
1—	150	G.E.	1200	275	2300
1—	150	Whse.	1200	275	2300

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200	Ridgeway	220	250
150	G.E.	2300/440	250
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100	G.E.	2300	250
100	Delco-G.E.	440	120/240
90	G.E.	440	60
75	A.C.	440	250
60	A.C.	2300	110
60	G.E.	440	250
40	Cr.-Wh.	220	125
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700	*G.E.	TS975Z	1.0	1200
600	*G.E.	TS7640	1.0	900
600	*G.E.	ATI	1.0	240
400	Westgh.	HG	1.0	900
300	G.E.	ATI	.8	900
300	*G.E.	ATI	1.0	720
300	Ideal	SNS	1.0	257
190	Ele-Meh	2S	1.0	720
175	*Westgh.	HR	1.0	360
150	*Westgh.	HR	.8	900
125	G.E.	ATI	1.0	900
125	*Ele-Meh		1.0	900
125	Cr-Wh.	103S	1.0	900
125	*G.E.	TS	1.0	277
115	Ele-Meh	EM	1.0	240
100	Cr-Wh.	103S	.8	900
100	*G.E.	ATB	.8	900
100	Westgh.		1.0	900

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1— 100 KW G.E., 250V. 900 RPM, 2300V. Syn.

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1— 250 H.P., West., CW, 600 RPM, 440V.
1— 200 H.P., West., CW, 600 RPM, 440V.
3— 150 H.P., Al. Ch. 1800 RPM, 2300V., 3PH, 60 Cy.
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P. O. BOX 51, ROCHESTER 1, N.Y.

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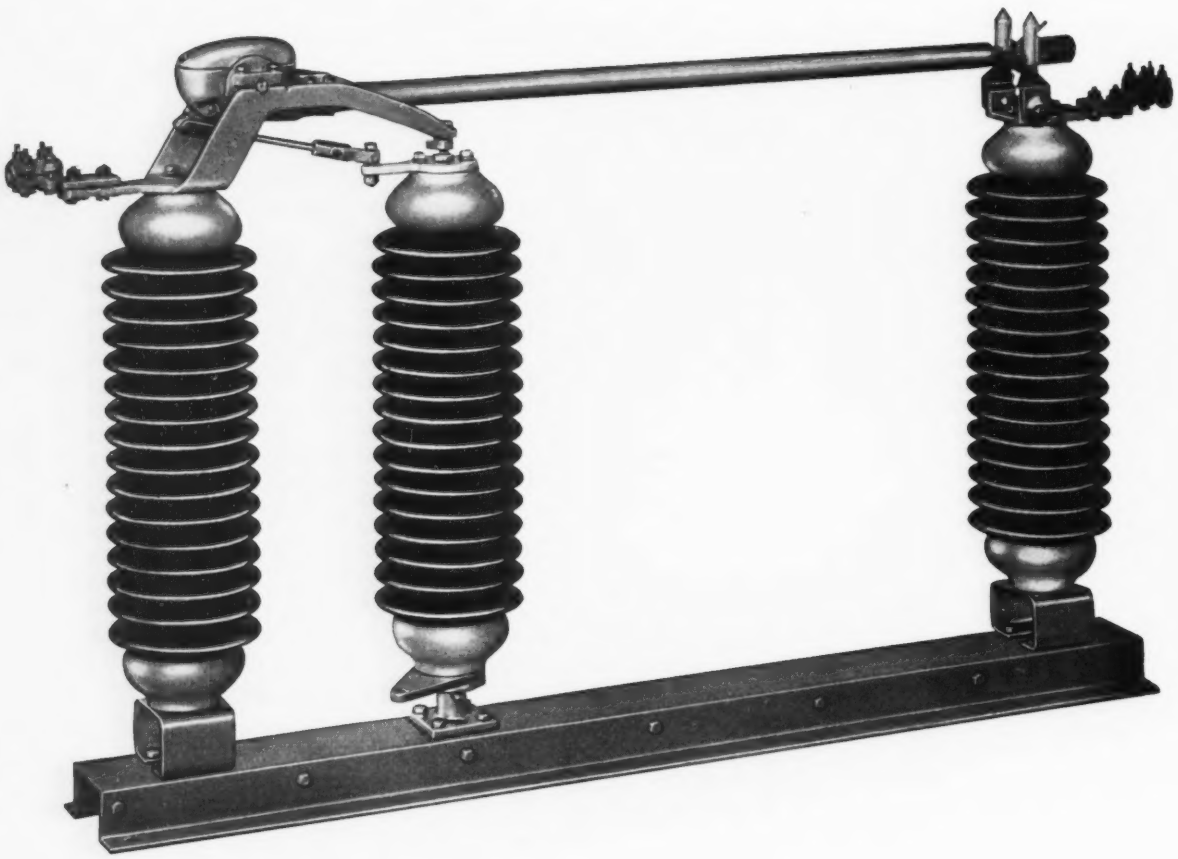
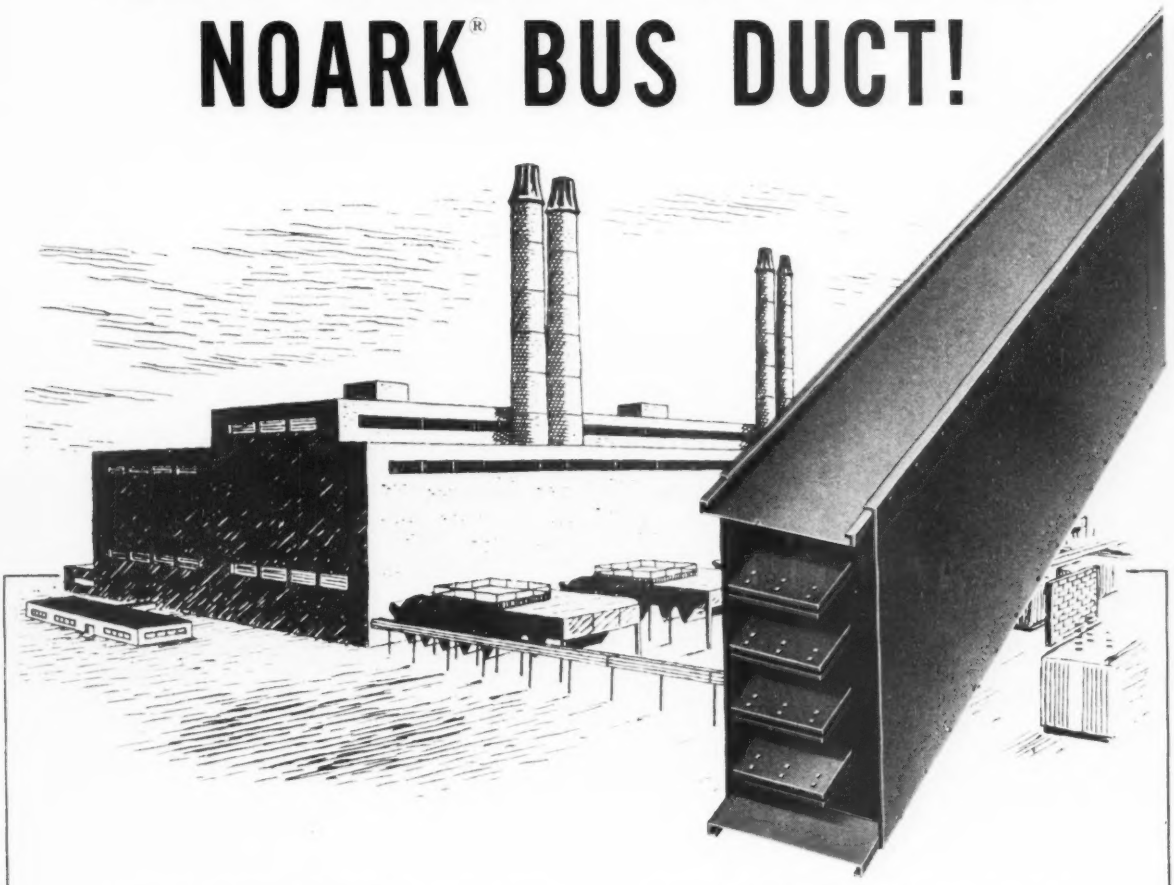
Cole Electric Co.

8439 Steller Drive | TExas 0-4701 | Culver City, Calif.



AIR BREAK DISCONNECTING SWITCH
69,000 Volts—600 Amperes
Type 0-2
Vertical Break, Three Pole, Single Throw
Group Operated—One Pole Shown
HIGH PRESSURE SILVER TO SILVER CONTACTS
See Bulletin 46-A

CON EDISON CHOOSES NOARK® BUS DUCT!



CONSOLIDATED EDISON'S new Astoria electric generating plant, across the East River from Manhattan, is nearing completion. Furnished throughout with the most modern and efficient equipment, Federal Noark feeder type Bus Duct of 2000 and 3000 amp. capacity has been installed to carry power to the motors driving the forced draft fans and boiler feed pumps. Designed to meet Consolidated Edison's low temperature specifications, the bus bars are specially wrapped and the bus duct housings are of aluminum. Installation was made by Lord Electric Company, Inc., New York City.

Federal Noark's standard line of bus duct has no equal for speed of installation, low-cost maintenance, and operational ease, speed and economy. In addition, Federal Noark, with its unusually wide experience, is outstandingly qualified to design and build special bus duct for the exact requirements of particular applications.

To assure top results on every usual and unusual demand for a bus duct electrical distribution system, write for the full Federal Noark Bus Duct story.

Federal Electric Products Company, 50 Paris Street, Newark 5, N. J.

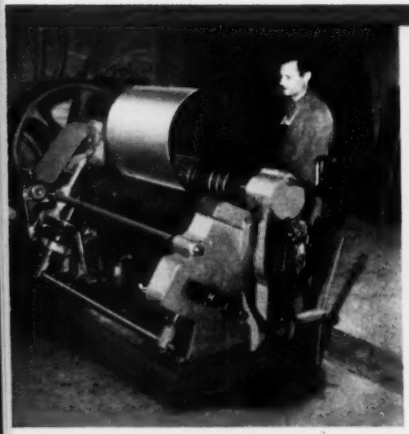
Plants at Newark, N. J.; Long Island City, N. Y.; Hartford, Conn.; Cleveland, Ohio; St. Louis, Mo.; Dallas, Texas; Los Angeles, Calif. Affiliated plant, Toronto, Canada.

Federal Noark products: Stab-lok Circuit Breakers, Motor Controls, Safety Switches, Service Equipment, Industrial Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales offices in principal cities.

FEDERAL NOARK®

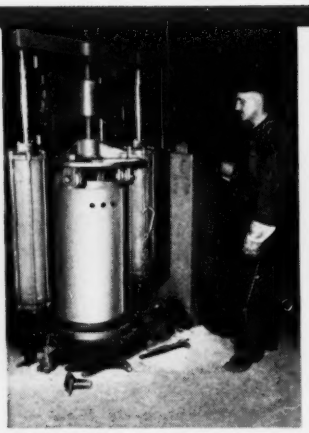
Federal NOARK

This is how *Kuhlman* makes distribution transformer tanks

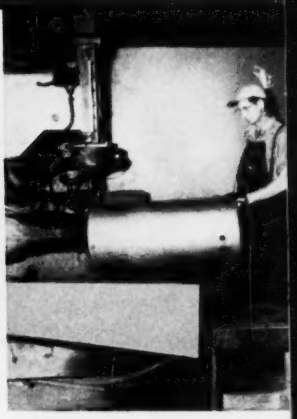


1. All Kuhlman transformer tanks are made of heavy gauge copper bearing steel. Here a tank begins to take shape. The steel has been measured and cut and the necessary openings made. It is now being rolled into the shape of a cylinder.

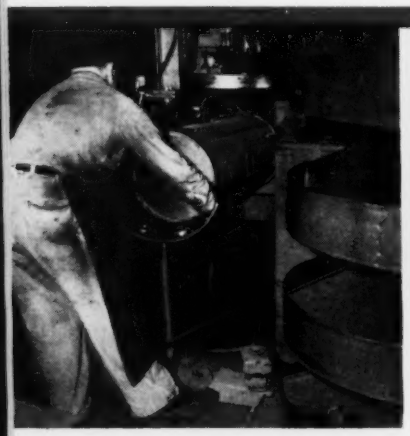
2. After the metal has been shaped, the edges are brought together and electrically welded to form an oil tight seam.



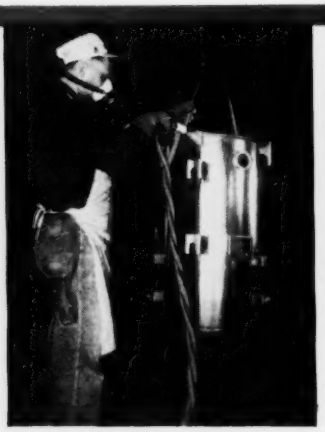
3. Next, the top end is "rolled down" to a smooth lip to form a suitable gasket seat.



4. The next step is to attach the bottom. This is first "spotted" and then electrically welded all the way around to form an oil tight seal.

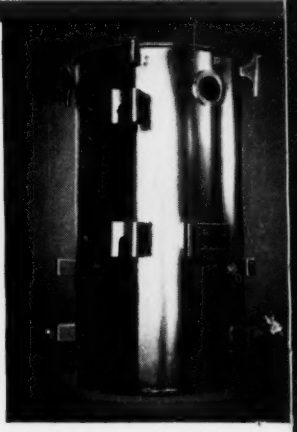


5. After the bottom end has been "rolled down" to form a smooth lip, the necessary accessories such as lifting ears, nameplate bracket, and mounting brackets are spot welded onto the tank as shown above.



6. Before they are painted the tanks are chemically cleaned and then shot blasted to assure a clean painting surface. Each tank receives a coat of rust inhibiting primer and two coats of corrosion resistant paint.

7. After each coat of paint the tanks are "baked" with infrared lights to insure a more durable finish.



8. And here is a completed tank, ready to receive its core and coil assembly and all necessary connections. Surfaces of Kuhlman tanks have successfully withstood 500 hours of salt spray and weatherometer tests.

Kuhlman transformers have been "on the line" for over half a century. Many of the earliest Kuhlman transformers are still in service—proof that Kuhlman builds rugged, highly efficient transformers. Specify Kuhlman. For more details about distribution transformers, ask for Bulletins CS-201 and CS-202.

Kuhlman **ELECTRIC COMPANY, BAY CITY, MICHIGAN**
CRYSTAL SPRINGS, MISSISSIPPI

KUHLMAN K E ELECTRIC

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15th Floor, 50 Church Street, New York 7, New York. Cable address: Microphone, New York.